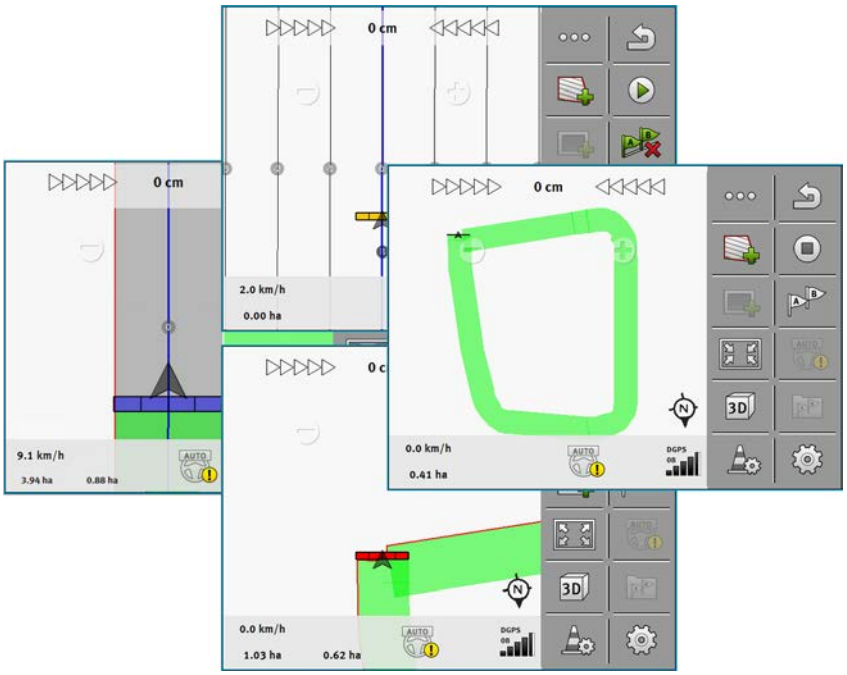
Operating Instructions

for TouchME/TOUCH1200

TRACK-Leader



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Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Imprint

Document

Operating Instructions
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1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Read the operating instructions for the agricultural device which you want to control by using the application.

1.2 Intended use

The software may be only used in connection with agricultural equipment and machines. The software may only be used away from public roads, during field operations.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

⚠ WARNING

This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

⚠ CAUTION

This signal word identifies low-risk hazards, which could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies actions which could lead to operational malfunctions if performed incorrectly.
These actions require that you operate in a precise and cautious manner in order to produce optimum work results.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. NOTICE! This is a notice. It warns that there is a risk involved in the next step.
2. Step involving risk.

1.4 User requirements

- Learn how to operate the terminal correctly. The terminal must not be operated by anyone who has not read the Operating Instructions.

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- Please read and carefully observe all safety instructions and warnings contained in these Operating Instructions and in the manuals of any connected vehicles and farm equipment.

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2 Operating procedures

In this chapter, you will find several overviews of steps that help you to process a field using the TRACK-Leader application. These overviews show you which sequential steps you can take and in which chapters they are explained in detail.

Before you begin, you have to configure the software. The entire configuration is described in the following chapter: Configuration [➞ 53]. If you are operating the terminal for the first time, configure the software and then return to this chapter.

2.1 When using parallel guidance only

This chapter is of interest to you if you have a simple system without an ISOBUS job computer. For example, the TRACK-Guide II terminal without additional applications. You can also operate other terminals according to these instructions, as long as you do not connect an ISOBUS job computer and the ISOBUS-TC application remains deactivated.

1. Drive to the field.
2. If you have already processed this field in the past, load its field data. [➞ 42] If you want to process a new field, you have to ensure that no other field data is loaded. In this case, you have to save or delete the opened recording.
3. If you have a prescription map, you can import it now.
4. Deactivate the "SECTION-Control" parameter on the "Settings" | "General" screen. [➞ 54]
5. On the "Settings" | "Machine profile" screen, select the profile that corresponds to the machine combination used. [➞ 67] Or create a new machine profile.
6. Start a new navigation. [➞ 22]
7. As a standard, the "Parallel" guidance mode is activated. If you do not want to work on straight, parallel tracks, change the guidance mode. [➞ 31]
8. If you want to work with overlaps, adjust the desired distance between the guidance lines [➞ 30].
9. If you are using a GPS receiver that works with EGNOS or WAAS, set the reference point [➞ 25].
10. Start the recording. [➞ 33]
11. Create the first AB line [➞ 27].
12. Mark the field boundary [➞ 35] (optional).
13. Process the field on parallel tracks. To do so, use the light bar [➞ 19].
14. If you are approaching an obstacle, you can mark its position. [➞ 40]
15. When the work is completed, save the data or export it for later processing with a GIS application. [➞ 42]
16. Copy the data onto a USB memory device [➞ 43] to be able to store them on a PC or to view them with TRACK-Guide-Desktop [➞ 51].

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2.2 When using SECTION-Control

This chapter is of interest to you if you have an implement with an ISOBUS job computer and want SECTION-Control to control the sections of the implement.

1. Drive to the field.
2. If you have already processed this field in the past, load its field data. [➞ 42] If you want to process a new field, you have to ensure that no other field data is loaded. In this case, you have to save or delete the opened recording.
3. If you have a prescription map, you can import it now.
4. Activate the "SECTION-Control" parameter on the "Settings" | "General" screen. [➞ 54]
5. Start a new navigation. [➞ 22]
6. As a standard, the "Parallel" guidance mode is activated. If you do not want to work on straight, parallel tracks, change the guidance mode. [➞ 31]
7. If you want to work with overlaps, adjust the desired distance between the guidance lines [➞ 30].
8. If you are using a GPS receiver that works with EGNOS or WAAS, set the reference point. [➞ 25]
9. Activate the automatic mode [➞ 34] of SECTION-Control or operate the implement manually.
10. Create the first AB line. [➞ 27]
11. Mark the field boundary [➞ 35] (optional).
12. Mark the headland [➞ 37] (optional).
13. Process the field on parallel tracks. To do so, use the light bar [➞ 19].
14. If you are approaching an obstacle, you can mark its position. [➞ 40]
15. When the work is completed, save the data or export it for later processing in a GIS application. [➞ 42]
16. Copy the data on a USB memory device [➞ 43] to store it on a PC or view with TRACK-Guide-Desktop [➞ 51].

2.3 When using the task management ISOBUS-TC

If you plan your ISO-XML tasks with the help of a Farm Management Information System (FMIS) on a PC and then want to work with the display, you will need to use the ISOBUS-TC application for this.

In this case, you must not save data in the TRACK-Leader application. All information generated while working will be transferred directly to ISOBUS-TC and saved in the file with the task.

The biggest difference compared to normal operation lies in the starting and termination of a navigation as well as the storage location of the data. Other functions are operated as described in these instructions.

1. Open the TRACK-Leader application.

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2. If you are using an implement with an ISOBUS job computer, activate the "SECTION-Control" parameter on the "Settings" | "General" screen [➞ 54]. If not, deactivate this parameter.
3. Open the ISOBUS-TC application.
4. Start a task. To do so, read the ISOBUS-TC operating instructions.
5. When the task has been started, open the TRACK-Leader application.
6. As a standard, the "Parallel" guidance mode is activated. If the ISO-XML task contains guidance lines, these are adopted and the corresponding guidance mode is selected. If you do not want to work on straight, parallel tracks, change the guidance mode. [➞ 31]
7. If you want to work with overlaps, adjust the desired distance between the guidance lines [➞ 30].
8. If you are using a GPS receiver that works with EGNOS or WAAS, set the reference point. [➞ 25]
9. If you are not using SECTION-Control, start the recording [➞ 33].
10. If you are using SECTION-Control, activate the automatic mode [➞ 34] of SECTION-Control or operate the implement manually.
11. Create the first AB line. [➞ 27]
12. Mark the field boundary [➞ 35] (optional).
13. Process the field on parallel tracks. To do so, use the light bar [➞ 19].
14. If you are approaching an obstacle, you can mark its position. [➞ 40]
15. When the work is completed, terminate the task in the ISOBUS-TC application.

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3 About these Operating Instructions

3.1 Applicability

These Operating Instructions apply to all modules of the TRACK-Leader application from Müller-Elektronik.

You can find the software version from which these Operating Instructions apply in the Imprint.

3.2 Target group of these Operating Instructions

These Operating Instructions apply to all users of the TRACK-Leader software and related additional modules.

3.3 Layout of operating instructions

The operating instructions explain step by step how you can perform certain operations with the product.

We use the following symbols throughout these Operating Instructions to identify different operating instructions:

Type of depiction	Meaning
1. 2.	Actions that must be performed in succession.
⇨	Result of the action. This will happen when you perform an action.
⇨	Result of an operating instruction. This will happen when you have completed all steps.
☑	Requirements. In the event that any requirements have been specified, these must be met before an action can be performed.

3.4 Layout of references

If any references are given in these Operating Instructions, they will appear as:

Example of a reference: [➞ 11]

References can be identified by their square brackets and an arrow. The number following the arrow shows you on what page the chapter starts where you can find further information.

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4 Product description

TRACK-Leader is a modern system enabling drivers of agricultural vehicles to keep exact lanes in the field.

The system has a modular design, so that the user can add further functions.

4.1 Performance description

Available functions of the software are subject to a license purchased for the modules.

There are two module types:

- Basis module: Prerequisite for additional modules.
  - TRACK-Leader
- Additional modules: can be combined as required.
  - SECTION-Control
  - TRACK-Leader TOP
  - VARIABLE RATE-Control

4.1.1 TRACK-Leader

Module type: Basic module. This is the prerequisite for all other modules.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.

To learn how to activate plug ins and licenses, read the installation and operating instructions to the terminal.

Functions

The following functions will be available after activation:

- Display of parallel guidance lines.
- Display of parallel guidance lines in headland.
- Marking of obstacles located in the field.
- Warning of obstacles marked.
- Warning of reaching a field boundary.
- Saving of work results in two formats.
- SECTION-View – Display of the sections that must be manually switched on and off by the driver to work without overlaps.

4.1.2 SECTION-Control

Module type: Additional module.

With SECTION-Control you can specify for any connected job computer what parts of the agricultural device it shall switch off, so that you avoid overlaps. This can be for example sections when working with a sprayer.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.
- License "SECTION-Control" must be unlocked.

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- The terminal must be connected to an ISOBUS job computer supported by SECTION-Control or to an SC-Box from Müller-Elektronik.
- The ISOBUS job computer must be configured.

Functions

The following functions will be available after activation:

- GPS-supported section-control.

4.1.3 TRACK-Leader TOP

Module type: Additional module.

With TRACK-Leader TOP you can specify how a Reichhardt steering job computer shall steer the vehicle, so that it follows the guidance lines set up through TRACK-Leader.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- License "TRACK-Leader" must be unlocked.
- License "TRACK-Leader TOP" must be unlocked.
- A steering job computer must be fitted, installed and configured on the tractor.
  - TRACK-Leader TOP works with steering job computers of the Reichhardt company: Steering ECU PSR, from software version 02-148
- Support for TRACK-Leader TOP must be activated on the steering job computer.

Functions

The following functions will be available after activation:

- Automatic steering of vehicle along defined guidance lines.

4.1.4 VARIABLE RATE-Control

Module type: Additional module.

Preconditions

To use this module, you need to meet the following preconditions:

- Plugin "TRACK-Leader" must be enabled.
- "VARIABLE RATE-Control" license must be activated.
- The ISOBUS job computer must support this function. It currently only works with sprayer job computers from Müller-Elektronik.

Functions

With "VARIABLE RATE-Control", you can:

- Import prescription maps in shp format.
- Transfer target rates from the prescription map to a job computer.

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5 Basic control principles

5.1 Initial start-up

Procedure

1. Start the terminal.
2. Tap the icon in the selection menu

⇨ The TRACK-Leader application appears in the main window:

5.2 Start screen layout

The start screen appears when you open the TRACK-Leader application and no navigation has been started.

TRACK-Leader Start screen

The Start screen allows you to:

- Switch to further screens.
- View the software version (numbers beside "TL" and "NG")

Controls

Function icon	Function
	Opens the preparation screen. From here, you can: ▪ Start a new navigation [→ 22]
	Appears instead of the "Navigation" function button if it is not possible to start a navigation. If you press this button, a message appears that mentions the cause. Possible causes: ▪ SECTION-Control is activated, but no ISOBUS job computer is connected. ▪ Test license has expired.

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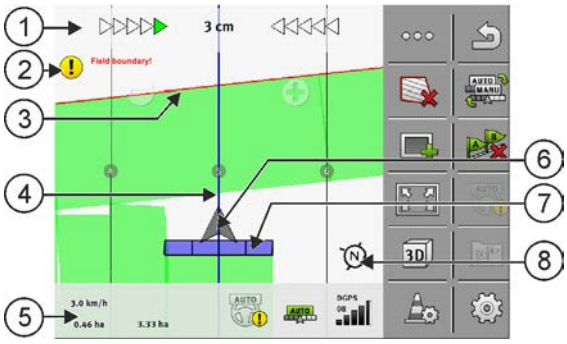
Function icon	Function
	▪ You are working without ISO-XML tasks, but the "Work with ISO-XML?" parameter is activated in the ISOBUS-TC application. Read more in the chapter: Cooperation with the ISOBUS-TC application [➞ 51] ▪ You are working with ISO-XML tasks and have not started a task. ▪ You have connected the terminal to a new ISOBUS job computer without re-starting the terminal. ▪ The device arrangement in the ISOBUS-TC application is incomplete.
	Opens the "Storage" screen. [➞ 42]
	Opens the "Settings" screen. [➞ 53]

5.3 Information on the work screen

As soon as you start the navigation, the work screen will appear. From here you can perform all other tasks which you will need during the field work.

The information shown on the work screen varies depending on whether the SECTION-Control [➞ 54] parameter is set to "yes" or "no".

The next illustration shows you the other information on the work screen which can appear during work.



Work screen while working

1	Screen light bar	5	Counter and status information
2	Notification of reaching the field boundary	6	Arrow showing the position of the GPS receiver
3	Field boundary	7	Working bar
4	Guidance line	8	Compass

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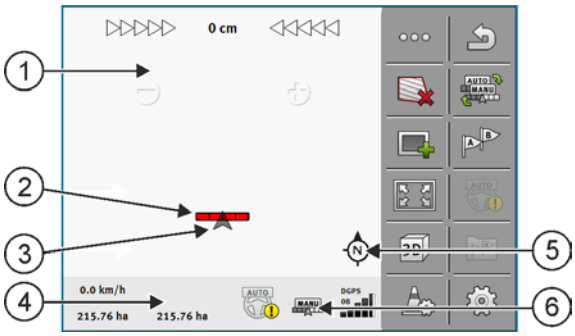


Work screen after the start, with SECTION-Control switched on

1	Navigation area	4	Current status information
2	Working bar	5	Compass
3	Icon of the vehicle	6	Status of SECTION-Control

Guidance lines

Guidance lines are lines which help the driver keep parallel tracks.

There are three types of guidance line:

- AB line - This is the first guidance line. This is always marked on the terminal screen with the letters A and B.
- Activated guidance line – this is the guidance line which the vehicle just follows. It is marked in blue.
- Not activated guidance lines – guidance lines not activated.

Position of GPS receiver

The center of the gray arrow above the working bar corresponds to the position of the GPS receiver.

Working bar

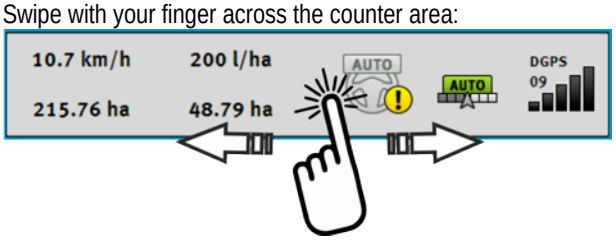
The working bar symbolizes the agricultural implement. This consists of multiple rectangles. Each rectangle corresponds to a section. The color of the rectangle can change while working.

See also: Using SECTION-View [➞ 19]

Counter and status information

In this area, you can see various information.

1. Swipe with your finger across the counter area:



⇨ The next display appears.

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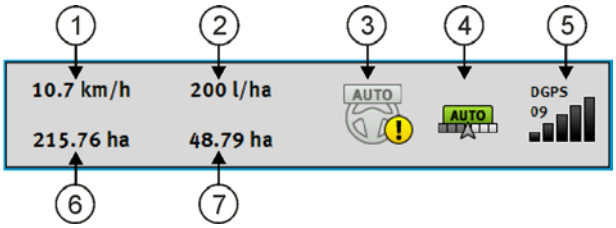
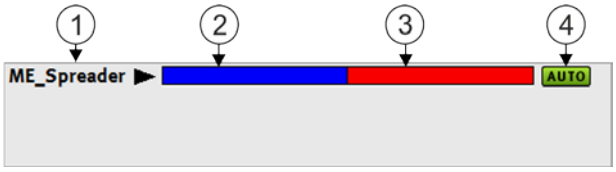


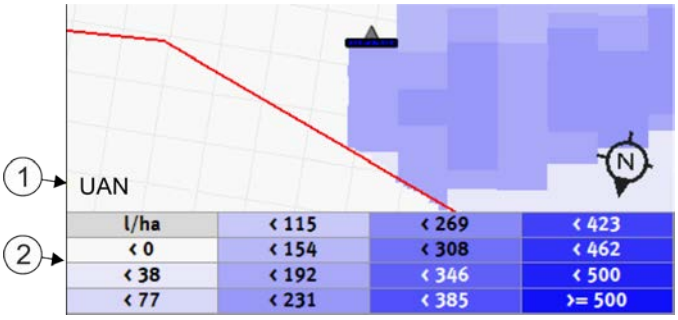
Counter

1	Speed	5	Quality of the GPS signal
2	Target rate from the prescription map	6	Area: - For a field with no field boundary: Already processed area. - For a field with field boundary: Total area of the field.
3	Status of TRACK-Leader TOP automatic steering	7	Only appears when you have marked the field boundary: - Area still to be processed.
4	Status of SECTION-Control: - AUTO - SECTION-Control controls the section actuation of the ISOBUS-job computer. - MANU - The ISOBUS job computer is operated manually.		



Display of the working width with the status of the sections, with connected ISOBUS job computers

1	Identification of the implement and the working width	3	Deactivated section
2	Spreading section	4	Working mode of SECTION-Control on this working width



Legend for the visualized target rates

1	Name of the legend The name is given by the job computer or by an ISO-XML task.	2	Legend

Field boundary

The field boundary shows the exact position of the field to the software and is the base for calculating the total size of a field.

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Compass

Shows where the north is.

Traveled areas and areas where the product has been applied

The surfaces to the rear of the vehicle icon are marked in green. This green color can have any of the following meanings, depending on the configuration:

- Traveled areas
  If you are only using TRACK-Leader, the traveled surface is marked. This is marked regardless of whether or not the vehicle applied product during this travel.
- Areas where product has been applied
  If you are using SECTION-Control, the surfaces where the product has been applied are marked. Surfaces over which the vehicle travels but where no product has been applied are therefore not marked.

If you want the software only to mark surfaces where the product has been applied in green, proceed as follows:

- Activate SECTION-Control

or

- Mount and activate the tool operating position sensor
  The tool operating position sensor recognizes that an agricultural device is in the operating position, and transmits this information to the terminal.

GPS connection status

Shows the status of the DGPS connection.

See also: Testing the DGPS signal quality [→ 21]

5.4 Inputting data

The data input screen is used to input data.

Controls

Function icon	Function
	Delete character
	Switch between upper and lower case
	Cancel input
	Confirm input

Procedure

1. - Select the desired characters.
2. - Transfer the desired characters.

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⇨ The characters have been applied. The cursor shifts one position forward.

3. Input further characters.
4. - Once you have entered all of the characters, confirm the input.

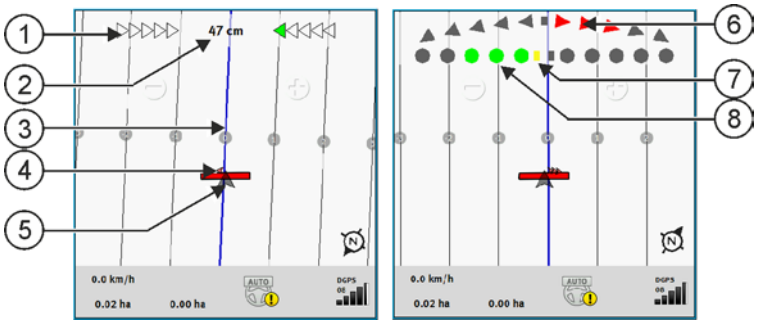
5.5 Parallel driving with the help of the light bar and the guidance line

The display screen-light bar helps you to follow the guidance line. This shows you when you have moved off the track and also once you have returned to the track.

The following types of screen light bars are available:

- The screen light bar in graphic mode
- The screen light bar in text mode

In addition to the screen light bar, a direction arrow appears on the screen, which indicates the correct steering direction.



Display screen light bar. Left: Text mode; right: Graphic Mode

1	Direction display of the light bar in text mode.	6	Triangle This shows you how sharply and the direction in which you must turn in order to reach the ideal position at a certain distance. See also the "Preview" parameter [➞ 55].
2	Current deviation from the guidance line.	7	Marking of the optimal position
3	Guidance line This shows the optimal position of the vehicle.	8	Current deviation from the guidance line. Each point corresponds to a deviation of 30 cm.
4	Direction arrow		
5	Position of GPS receiver		

To change the type of light bar during operation, swipe over the light bar on the screen. You can also use this to switch over to the SECTION-View [➞ 19].

5.6 Using SECTION-View

SECTION-View is a schematic display of the work width and the sections. This displays the vehicle as an icon and can replace the screen light bar.

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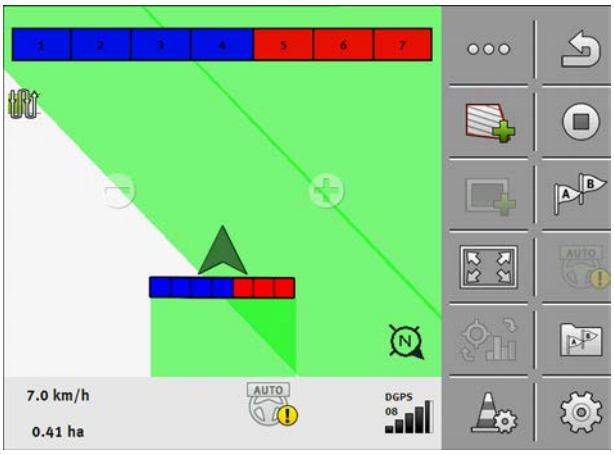
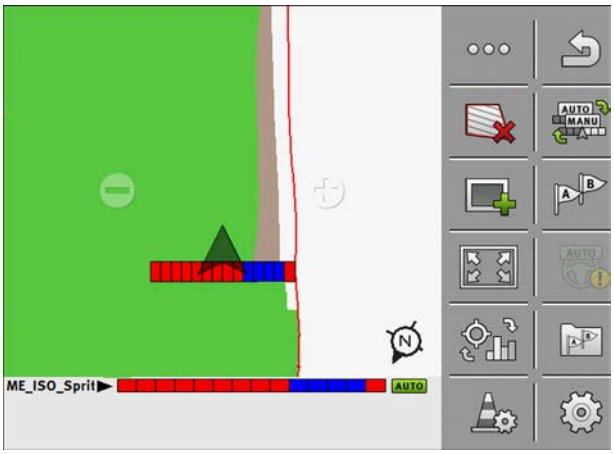


Without an ISOBUS job computer: SECTION-View in the header and as a working bar



With an ISOBUS job computer: SECTION-View in the footer and as a working bar

If you are working without an ISOBUS job computer, you can use the display to help you when switching sections. If you are working with an ISOBUS job computer, the sections are actuated automatically. The colors tell you their current status.

Color	You have to:
Gray	The recording is deactivated. Beneath the section, the field has already been processed, or the vehicle is stopped.
Yellow	The recording is deactivated. The ground beneath the section is unprocessed.
Red	Switch off the section. The recording is activated.
Blue	Switch on the section. The recording is activated.

5.7 Changing the work screen

You can change the display of the work screen in several ways.

Controls

Control element	Function
	Zoom in and out.

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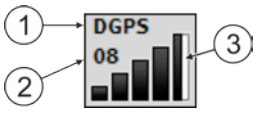
Control element	Function
	Display the whole field.
	Display vehicle surroundings.
	Activate 3D view
	Activate 2D view.

5.8 Checking the quality of the GPS signal

The better the GPS signal, the more TRACK-Leader can work precisely and reliably. The quality of the GPS signal depends on several factors:

- On the model of the GPS receiver;
- On the geographical location (correction satellites are not available in some areas of the world);
- On local shadowing effects on the field (trees, mountains).



Information on the work screen

1	Current quality of the GPS signal	3	Bar chart Indicates the quality of the connection. The higher the number of blue bars, the better the connection.
2	Number of connected satellites		

Quality of the GPS signal

Quality	Description
RTK fix	Highest precision.
RTK float	Ca. 10 to 15 cm track-to-track precision.
DGPS	GPS with correction signal. Depending on the GPS receiver and configuration: WAAS, EGNOS, GL1DE or other.
GPS	Weak and imprecise signal.
INV	No GPS signal. Working is not possible.

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6 Operation while working

6.1 Starting navigation

There are two ways of starting a navigation:

- Using the TRACK-Leader application, if you are working with no ISO-XML tasks. [➞ 22]
- Using the ISOBUS-TC application, if you are working with ISO-XML tasks. [➞ 23]

Possible problems

If you are unable to start the navigation, and the grayed-out icon appears on the start screen, this can be due to the following reasons:

- SECTION-Control is activated, but no ISOBUS job computer is connected.
- You are working without ISO-XML tasks, but the parameter "Work with ISO-XML?" is set to "Yes" in the ISOBUS-TC application.
- You are working with ISO-XML tasks and have not started a task.
- You have connected the terminal to a new ISOBUS job computer without re-starting the terminal.

6.1.1 Without an ISO-XML task

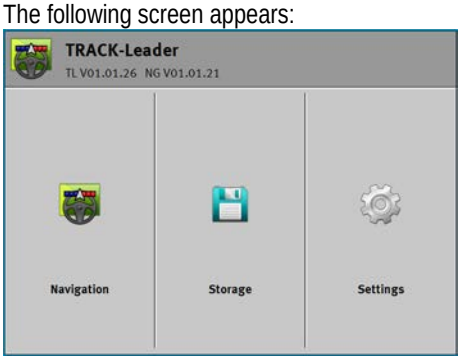
Procedure

☑ You have configured the "SECTION-Control" parameter. [➞ 54]

☑ If you are working with an ISOBUS job computer, it has to be connected to the ISOBUS.

☑ If you are working without an ISOBUS job computer, you have to select the corresponding machine profile for the implement.

☑ You have set the "Work with ISO-XML?" parameter to "No" in the ISOBUS-TC application.

1. - Open the TRACK-Leader application.
   ⇨ The following screen appears:
   

   ⇨ If the text "..." appears instead of "Navigation", you have not fulfilled one of the preconditions.
2. Tap "Storage".

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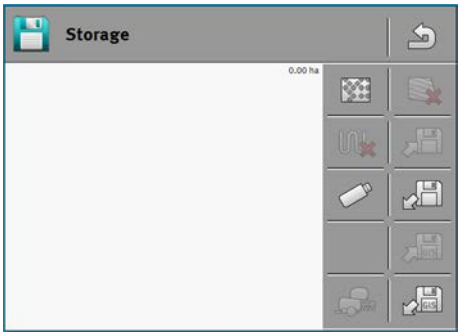
⇨ The "Storage" screen appears: [➞ 42]



3. You must now decide whether you want to process a field for the first time, or if you want to work on a field whose field boundaries you have already marked.
4. If you want to process a new field, you must ensure that there is no previous recording in the storage. Tap to discard the opened recording. (The recording will not be deleted from the SD card.)
   ⇨ No field is displayed on the screen.
5. If you want to process a field whose field data you have already saved, tap to load the field data from the SD card.
   ⇨ The field that you have loaded appears on the screen.
6. - Exit the "Storage" screen.
   ⇨ The application start screen appears.
7. - Start a new navigation.
   ⇨ The work screen appears. It only contains the icon for the vehicle or also loaded field boundaries and covered areas - depending on what you have done on the "Storage" screen.
   ⇨ If the icon appears in the center of the display screen, there is no connection to the GPS receiver, and you will not be able to continue work. Install and configure a GPS receiver.
8. To find out about the information appearing on the work screen, read this chapter: Information on the work screen [➞ 15]
9. To find out what you should do next, read this chapter: Operating procedures [➞ 8]

6.1.2 With an ISO-XML task

Use this method if you are using the "ISOBUS-TC" application.

Procedure

☑ If you are working with an ISOBUS job computer, it has to be connected to the ISOBUS.

☑ If you are working without an ISOBUS job computer, you have to select the corresponding machine profile [➞ 68] for the implement.

☑ You have configured the "SECTION-Control" parameter. [➞ 54]

☑ You have set the "Work with ISO-XML?" parameter to "Yes" in the ISOBUS-TC application.

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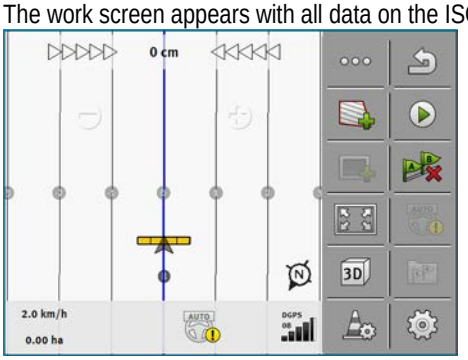
1. Start a task in the "ISOBUS-TC" application. You can read how to do this in the ISOBUS-TC operating instructions.
2. - Open the TRACK-Leader application.
   ⇨ The work screen appears with all data on the ISO-XML task:
   

   ⇨ If the work screen does not appear, this means that you have not fulfilled a number of the preconditions.
   ⇨ If the icon appears in the center of the display screen, there is no connection to the GPS receiver, and you will not be able to continue work. Install and configure a GPS receiver.
3. To find out about the information appearing on the work screen, read this chapter: Information on the work screen [➞ 15]
4. To find out what you should do next, read this chapter: Operating procedures [➞ 8]

6.2 Calibrating DGPS

DGPS means "Differential Global Positioning System".

This system is used to determine the position of the vehicle.

When should you calibrate?

If and when you calibrate the signal is dependent on the signal you use:

- If your GPS does not use a correction signal, you will need to calibrate the GPS signal every time before starting work.
  The more precisely you do this, the more precisely your system will operate. Conversely, the less precise the GPS calibration, the less precisely the system might be able to determine the position of the vehicle.
- When using an RTK correction signal, you need neither set a reference point nor calibrate the GPS signal. The position of the tractor is continuously corrected by the RTK provider by means of a correction signal.

Problem description

Throughout the course of the day, the Earth is turning and the satellites change their position in the sky. The calculated position of a point will as a result shift. This shift means that the position will after a certain time no longer be up-to-date.

This phenomenon is called a "drift", and can be minimized.

For your purposes, this means that all of the field boundaries and guidance lines which you create during a day will have shifted after a few hours.

Solution to the problem

There are two ways of compensating for the drift:

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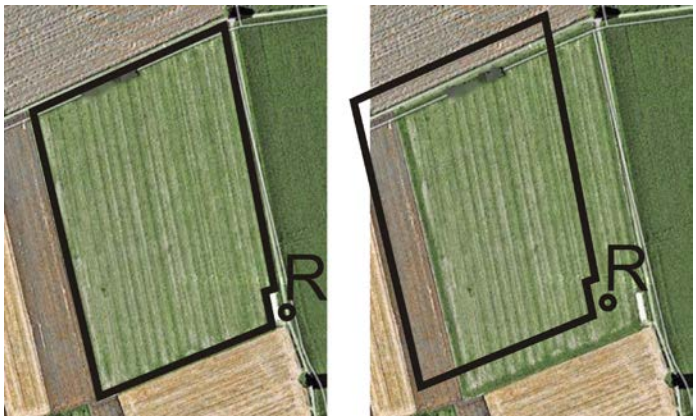
- Using the reference point – By setting the reference point and calibrating the GPS signal each time before starting work. A free-of-charge way to use the A100 GPS receiver which provides an accuracy of up to +/- 30cm.
- By using a correction signal. A chargeable service provided by the GPS provider. Only for use in conjunction with a very accurate GPS receiver. The GPS signal must be re-calibrated automatically and at regular sequences. This enables an accuracy of less than five centimeters.

6.2.1 What do you need a reference point for?

A reference point will enable you to compare your actual GPS coordinates with the saved GPS coordinates and compensate for any drift (displacement).

A fixed permanent point on the ground is needed for calibrating the GPS signal. This is the so-called reference point. When the GPS signal is calibrated, the stored coordinates of the Reference point are compared and matched with the current coordinates.



Left – field with calibrated GPS signal; Right – field with no calibrated GPS signal

If you do not set a reference point nor calibrate the GPS signal each time before starting work, the following will happen:

- The saved GPS coordinates for the field boundary, guidance lines, etc. will differ from the actual values.
- As a result, you may miss applying the product over areas in the field which are outside of the field boundaries according to the GPS.

In order to ensure maximum precision:

1. Set a reference point for each field at the first product application.
2. Before processing a field for which you have already set the reference point, calibrate the GPS signal.
3. If the field is large and you will process this over several hours, perform a calibration on the GPS signal.

6.2.2 Set a reference point

The coordinates of the GPS receiver are crucial when setting the reference point. If you do not want to dismantle the GPS receiver each time, you must always set the vehicle in the same position. This means that the GPS receiver is also in the same position.

When setting the reference point, you will require a fixed permanent point whose position will not alter over time. This can for example be a tree, a landmark or a manhole cover.

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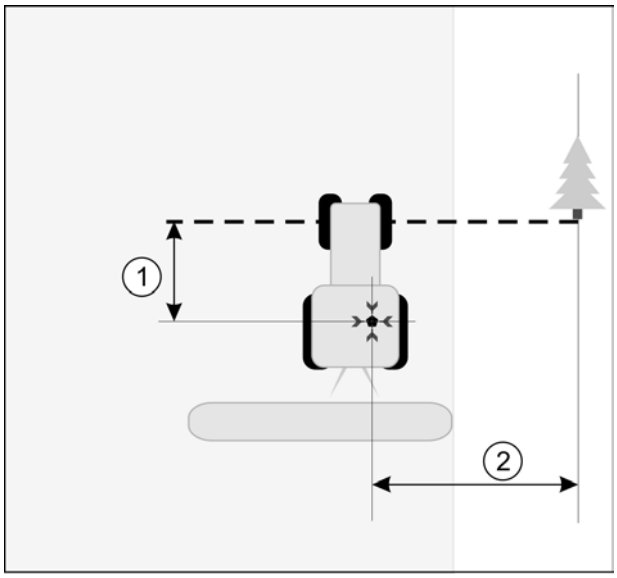
This point is required in order to position the tractor in exactly the same position for future GPS signal calibrations.

NOTICE

Data loss due to the lack of a reference point
If you are unable to locate the reference point in the future, the recorded data will be unusable.

- Always remember the precise position of the reference point for each field!

The illustration below shows a possible position of the tractor when setting the reference point:



Tractor when setting the reference point

•	GPS receiver on the roof of the tractor cab	✳	Position of the reference point
①	Distance between the GPS receiver and the X-axis point on the roadside	②	Distance between the GPS receiver and the Y-axis point on the roadside
- - -	Line from a fixed permanent point over the road		

Procedure

☑ When you are working the field for the first time.

1. Find a fixed point at the entrance to the field. This can for example be a tree, a landmark or a manhole cover.
2. Draw a line from this point over the path on which the vehicle is standing.
3. Position the vehicle with its two front wheels on the line.
4. Write down the distance between the fixed point and the vehicle. You must also adhere to this distance when calibrating the GPS signal.
5. Start a new navigation.
6. Tap the following icons consecutively:

   ⇨ An "R" and a point will appear on the terminal screen, marking the reference point on the field. The point is located beneath the arrow.

⇨ You have now set the reference point.

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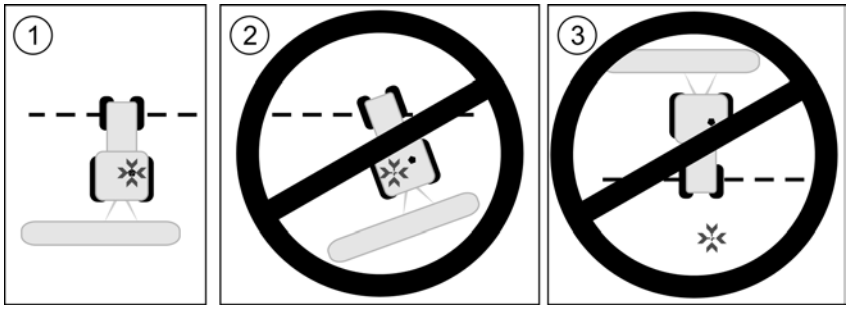
6.2.3 Calibrating GPS signal

When calibrating the GPS signal, the GPS receiver must be in the exact same position as that when setting the Reference point.



Position of the GPS receiver in relation to the reference point when calibrating the GPS signal

✲	Position of the reference point
▪	GPS receiver on the roof of the tractor cab

When should you calibrate?

You will need to calibrate the GPS signal in the following instances:

- Each time before starting work
- When you find that a deviation is shown on the screen even when driving down a swath.

Procedure

☑ There is a reference point for the field.

1. Drive to the position at which you set the reference point.
2. Position the vehicle with both of its front wheels on the line which you drew when setting the reference point. The vehicle must be positioned at the same angle as when the reference point was set. The distance from the fixed permanent point on the roadside must be the same as when the reference point was set.
3. Tap the following icons consecutively:

   ⇨ A window will appear showing you how many meters the signal has drifted since the last calibration.

⇨ You have calibrated the GPS signal.

6.3 Using guidance lines for parallel guidance

Guidance lines are parallel lines which are displayed on the terminal screen. These help you to treat the field in parallel lines.

The first guidance line which you lay out on the terminal is called the AB line. On the terminal screen, these are usually marked with the letters A and B. All further guidance lines will be calculated and designated on the basis of the AB line.

The path of the AB line will be saved after the first drive-over, which you must perform manually. The operation of the terminal will depend on the guidance mode that you have chosen.

To be able to change the working direction on every field, you can create several guidance line sets [➞ 31]. For every guidance line set, you can create the guidance lines in a different direction and in a different mode.

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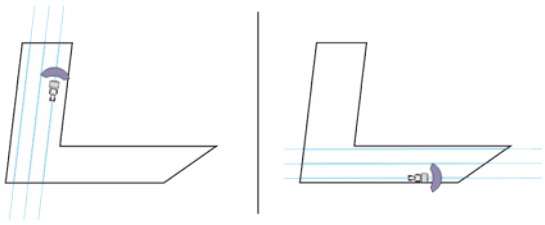
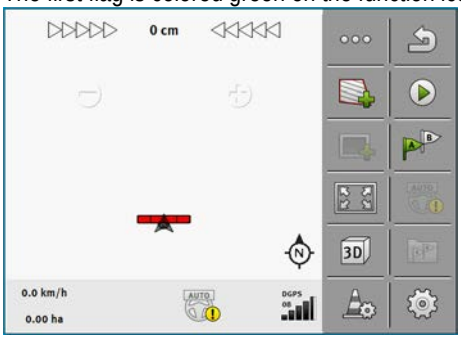
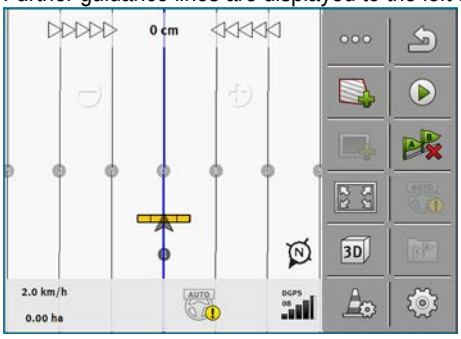


You can select a guidance line set for each direction.

6.3.1 Straight guidance lines

Procedure

☑ "Parallel" guidance mode is activated. [→ 31]

1. Position the vehicle at the starting point of the desired AB line.
2. - Set the first point.
   ⇨ Point A appears on the terminal screen.
   ⇨ The first flag is colored green on the function icon.
   ⇨ 
3. Drive to the other side of the field.
4. - Set the second point.
   ⇨ Point B appears on the terminal screen.
   ⇨ The second flag is colored green on the function icon.
   ⇨ Points A and B are connected with a line. This is the AB line.
   ⇨ Further guidance lines are displayed to the left and right of the AB line.
   ⇨ 

6.3.2 Guidance lines as a curve

Procedure

☑ "Smoothed contour" or "Identical contour" guidance mode is activated. [→ 31]

1. Position the vehicle at the starting point of the desired AB line.
2. - Set the first point.

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⇨ Point A appears on the terminal screen.

3. Drive to the other side of the field. You do not need to drive in a straight line when you do this.
   ⇨ During the drive, a line will be drawn behind the vehicle on the terminal screen.
4. - Set the second point.
   ⇨ Point B appears on the terminal screen.
   ⇨ Points A and B are connected with a line.

6.3.3 Guidance lines using a compass

Procedure

☑ Guidance mode "A+" is activated. [➞ 31]

1. Position the vehicle at the starting point of the desired AB line.
2. Tap the icon:
   ⇨ A keyboard will appear.
3. Input the direction of the compass towards which you want the guidance lines to lead. You can input a value between 0° and 360°.
4. - Confirm.
   ⇨ Multiple parallel guidance lines are drawn on the terminal screen, and these all run in the direction which you have entered.

6.3.4 Guidance lines as circles

Procedure

☑ "Circle" guidance mode is activated.

1. Position the vehicle at the outer edge of the field, next to the circular irrigation equipment.
2. - Set the first point.
3. Drive at least halfway around the circumference of the field.
4. - Set the second point.
   ⇨ Circular guidance lines appear on the terminal screen.

6.3.5 Adaptive guidance lines

Procedure

☑ "Adaptive contour(s) manual" or "Adaptive contour(s) auto" guidance mode is activated.

1. Position the vehicle at the starting point of the desired AB line.
2. - Set the first point.
3. Drive to the other side of the field.
   ⇨ A line is drawn behind the arrow icon.
4. - Mark the turn maneuver in "Adaptive contour(s) manual" guidance mode.
5. Make a turn in "Adaptive contour(s) auto" guidance mode. The system will automatically notice that you are turning.

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⇨ New guidance lines appear to the left and right of the drawn line.

6. Follow the new guidance line.

6.3.6 Deleting guidance lines

You can delete guidance lines and create new ones at any time.

Procedure

1. Touch one of the following functions icon for approx. 3 seconds: . The icons can appear different depending on the guidance mode.
   ⇨ The following message will appear: "Do you want to delete the guidance lines?"
2. "Yes" - to confirm.
   ⇨ The guidance lines will be deleted.

6.3.7 Moving guidance lines

Use this function if you are indeed on the desired line of travel but the position of the tractor is shown beside the track on the terminal.

This function only operates in the following guidance modes:

- Parallel
- Smoothed contour
- Identical contour

Procedure

☑ Navigation is started.

1. - Call up the next page with function icons.
2. - Move the guidance lines to the position of the GPS receiver.

⇨ The guidance lines, field boundaries and routes will be moved.

6.3.8 Setting the distance between the guidance lines

As standard, the distance between the guidance lines corresponds to the work width, but you can change this distance.

Example

Sprayer working width = 59.05 ft (18 m)

You want to ensure that nothing is left out during field treatment.

Set the "Line spacing" parameter to 58.38 ft (17.80 m), for example. You will then work with a 0.67 ft (20 cm) overlap (0.33 ft (10 cm) on the left and 0.33 ft on the right).

Procedure

☑ Navigation is started.

1. - Switch to the "Navigation settings" screen.
   ⇨ The "Navigation settings" screen appears.
2. Tap "Line spacing".
   ⇨ The keyboard appears.
3. Enter how many feet (meters) there should be between two guidance lines.

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4. - Confirm.
   ⇨ The "Navigation settings" screen appears.
5. Exit the screen.

6.3.9 Setting the guidance line skip mode

When you want to drive in parallel and thus use every second or third guidance line, you can set these guidance lines to be marked more boldly than the others.

Example

If you input the number "2", every second guidance line will be displayed in bold, whereas inputting the number "3" will display every third guidance line in bold, etc.

Procedure

☑ Navigation is started.

1. - Switch to the "Navigation Settings" screen.
   ⇨ The "Navigation Settings" screen will appear.
2. Tap "Pattern interval".
   ⇨ The keyboard will appear.
3. Input the interval at which the guidance lines should be marked in bold.
4. - Confirm.
   ⇨ The "Navigation Settings" screen will appear.
5. Leave the screen.

6.3.10 Selecting guidance mode

The guidance mode determines how the guidance lines are applied and how these run over the field.

Function icon	Function
	Exits the "Guidance line sets" screen without adopting a new guidance line set.
	Creates a new guidance line set.
	Enables the modification of a guidance line set.
	Deletes the marked guidance line set.

Procedure

☑ A navigation is started.

1. - Switch to the "Guidance line sets" screen.
   ⇨ The "Guidance line sets" screen appears.
2. - Create a new guidance line set.
   ⇨ The "Guidance line set" screen appears, with the lines: "Guidance mode" and "Name".

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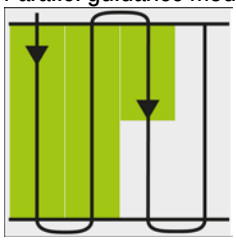
3. Tap the "Guidance mode" line.
   ⇨ A list appears.
4. Select the desired guidance mode.
5. - Confirm your selection.
   ⇨ The "Guidance line set" screen appears.
6. - Exit the screen.
7. The "Guidance line sets" screen appears.
8. Double-tap the desired guidance set to activate it on the navigation screen.
   ⇨ The guidance lines of the guidance line set used until now will be hidden.
   ⇨ You have changed the guidance mode and can now create a new guidance line.
   ⇨ You can change the guidance line set at any time.

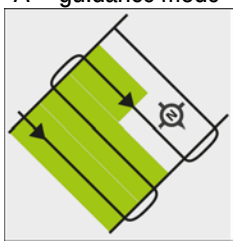
The following guidance modes are available:

- Parallel guidance mode



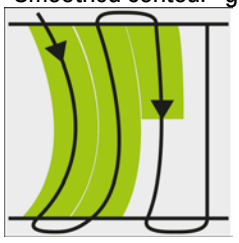
This guidance mode allows you to work the field in parallel, straight lines.

- "A+" guidance mode



This guidance mode allows you to manually input the geographical direction in which the guidance lines should be laid. To do this, simply input the direction in degrees (between 0° and 360°), and the guidance lines are automatically laid, parallel to each other.

- "Smoothed contour" guidance mode



In "Smoothed contour" guidance mode, the the curvature of each guidance line curve is altered to straighten the guidance line as you move across the field. The guidance lines are straight in the direction of travel.

- "Identical contour" guidance mode

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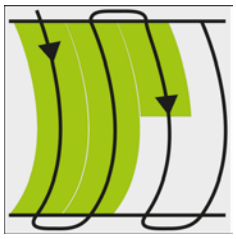
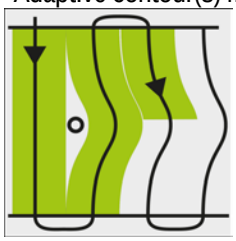


In identical contour guidance mode, there is no variation in the curvature. Only use this mode for gentle curves.
The disadvantage of this guidance mode is that the distance between the guidance lines will eventually become too large. It will then no longer be possible to apply the product onto the field accurately using the track-to-track process.
If you notice excessive distances between the guidance lines, delete the guidance lines and create a new A-B guidance line.

- "Circle" guidance mode

This guidance mode allows you to lay out circular guidance lines in order to treat fields which are equipped with circular irrigation equipment.

- "Adaptive contour(s) manual" guidance mode



In this guidance mode, the path of the vehicle is recorded during each crossing. The next guidance line is only laid out after a turn. This will be an exact copy of the last crossing.
You must press a button before each turn.

- "Adaptive contour(s) auto" guidance mode
  This mode functions in the same way as "Adaptive contour(s) manual", but the terminal automatically recognizes that you are turning.

6.4 Starting track recording

You do not need to read this Chapter if:

- SECTION-Control is activated
- You have a tool operating position sensor

If you do not use SECTION-Control or have not mounted any tool operating position sensor, the software will not know when your equipment (e.g. sprayer) is working and when it is not. You will therefore need to tell the software when you begin the task.

Recording the tracks enables you to see the parts of the field which you have already traveled through on the screen.

Procedure

☑ You have started a navigation.

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1. - Start the recording as soon as you start working.
   ⇨ The function icon changes its appearance:
   ⇨ The processed area behind the vehicle icon is marked in green.

6.5 Changing working mode of SECTION-Control

If SECTION-Control is activated, you can work in two modes:

- Automatic mode
  In the automatic mode, the system switches the sections on and off automatically.
- Manual mode
  In the manual mode, you always have to switch the sections on and off manually.

Controls

Switch between manual and automatic mode

To see which mode is activated, look at the work screen:

	Automatic mode is activated.
	Manual mode is activated.

6.6 Operating implements with several working widths

If you are using a job computer in which several working widths are configured, SECTION-Control can recognize these automatically.

For example, this could be the case for the following implements:

- Sprayer with two booms
- Seeders that spread fertilizer in addition to seed

SECTION-Control enables individual configuration of the switching behavior for each working width. For this reason, there is a profile for each working width on the "Settings" | SECTION-Control" screen. [→ 56]

On the navigation screen, the results for all of the working widths cannot be displayed simultaneously. This would make the display unclear. You must therefore activate a working width. The area it processed is marked in green on the screen.

All areas that are processed by the other working widths are recorded in the background. As soon as you activate a different working width, you will also see its work results.

Procedure

This is how to activate a working width:

☑ The implement has two working widths.

☑ SECTION-Control is activated.

☑ A navigation is started.

1. Swipe across the counters towards the left until the icons for the working width appear.
   ⇨ The activated working width is marked with an arrow.

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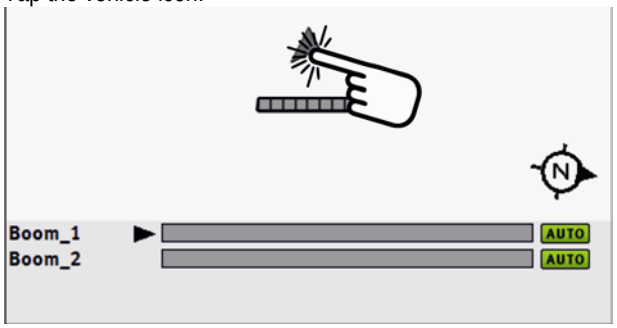
2. Tap the vehicle icon:



⇨ The next working width is activated.

6.7 Field boundary

6.7.1 Marking the field boundary

You must mark the field boundary for each new field.

You can mark this field boundary while applying the product in the headlands.

Depending on whether or not you are working with an RTK correction signal, you can:

- Possibility 1:
  Applicable in both cases.
  - Travel around the field.
  - You can calculate the field boundary along the green tracks which were created during this travel around the field.
  - Apply product in the interior of the field.
- Possibility 2:
  Recommended with RTK correction signal only.
  - Apply product in the interior of the field.
  - Travel around the field.
  - You can calculate the field boundary along the green tracks which were created during this travel around the field.

  This method also works without an RTK correction signal, although you will need to calibrate the GPS signal before applying the product and calculating the field boundary. This is because the GPS position drift occurs between the start of work and the calculation of the field boundary.

Procedure 1

If you first want to travel around the field, you should create the field boundaries as follows:

☑ You have set a "reference point" or calibrated the GPS signal. (if you are working with no RTK correction signal)

1. Start a new navigation.
2.

- If you are working with SECTION-Control, activate Automatic mode.
3. - If SECTION-Control is deactivated, start recording.
4. Switch on the mounted or trailed implement. This must work.

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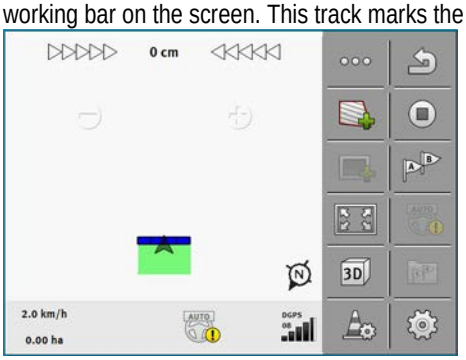
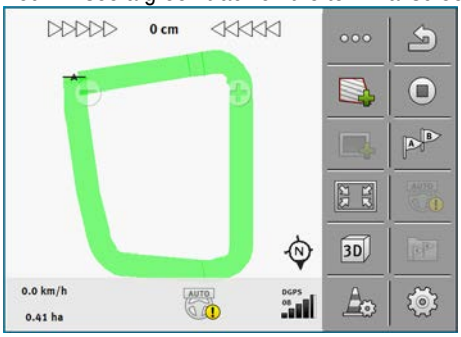
5. Begin to drive over the field.
6. Tip: You can also set up the AB line while travelling over the field.
   ⇨ After driving a few centimeters, you will see that a green track is being left behind the working bar on the screen. This track marks the area where the product has been applied:

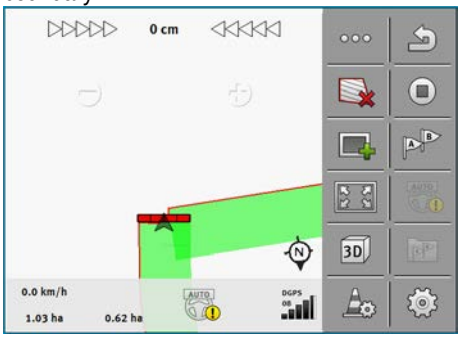


   ⇨ If no green track appears, this can be due to the following reasons:
   a) you haven't switched on the farm implement (using SECTION-Control)
   b) You haven't touched the function icon (no SECTION-Control).
7. Drive over the entire field.
8. Stop at the exit point.
   ⇨ You will see a green track on the terminal screen, which circles the entire field:



9. - Mark the field boundary.

⇨ A red line drawn around the field is now shown on the navigation screen. That is the field boundary:



Procedure 2

If you first want to apply the product in the field, you should create the field boundaries as follows:

☑ You must have an RTK correction signal available.

1. Start a new navigation.
2. - If you are working with SECTION-Control, activate Automatic mode.

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3. - If SECTION-Control is deactivated, start recording.
4. Process the field.
   ⇨ After the first few centimeters, you will see that a green track is marked on the terminal screen behind the working bar. This track marks the area where the product has been applied.
   ⇨ If no green track appears, this can be due to the following causes:
   a) You haven't switched on the mounted implement (SECTION-Control)
   b) You have not taped the function button (TRACK-Leader).
5. Finally, process the field along the field boundary.
6. - Mark the field boundary.

⇨ A red line drawn around the field is now shown on the navigation screen. This is the field boundary.

6.7.2 Deleting a field boundary

Procedure

1. Touch the following function icon for approx. 3 seconds:
   ⇨ The following message will appear: "Do you want to delete the field boundary?"
2. "Yes" - to confirm.

⇨ The field boundary will be deleted.

6.8 Working in headlands

In the headland you can lay out guidance lines which will guide you around the field.

Advantages:

- You can apply product in the headland after applying the product in the center of the field. In this way, no spray residue remains on the tires after product application in the headland.
- SECTION-Control switches off the boom sections which are in the headland area when the product is being applied onto the field.

Restrictions:

- When working with headlands, the TRACK-Leader TOP automatic steering system cannot be used. The driver must steer the vehicle himself, manually.

Function icon	The software is in this state when the icon appears	This happens when you tap the function key next to the icon
	Headland is deactivated and has never been activated for this field before. The field boundary has not been recorded.	Cannot be tapped.
	Headland is not activated. First appears when the field boundary has been marked.	Calls up a window in which the guidance lines can be defined in the headland.

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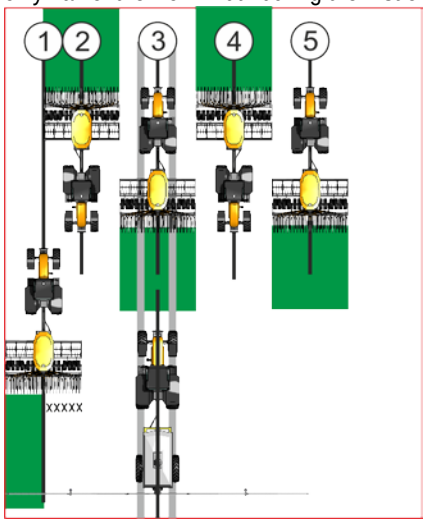
Function icon	The software is in this state when the icon appears	This happens when you tap the function key next to the icon
	You can now apply the product inside the field. SECTION-Control only applies product in the interior of the field. Sections will be switched off when passing over to a headland. Parallel navigation within the field is activated.	Parallel navigation in headlands will be activated.
	Now you can apply the product to the headland.	Parallel navigation within the field will be activated.

Parameter

You must set the following parameters:

- "Headland width"
  Input here how wide the headland should be. You can input the work width of the widest machine as a basis, for example the sprayer.
- "Guidance line distance"
  Here, input how widely separated from each other the guidance lines should be. This normally corresponds to the work width of the used working equipment.
- "Half-side mode"
  Parameter for seeders only.
  Set the parameter to "yes" when you want to lay out guidance lines for the sprayer with the seeder and thus lay out both guidance lines in a single drive-over.
  In this mode, the guidance lines are laid out in such a way that the seeder can only work with only half of the work width during the first or second driver-over.



Procedure

☑ A field with field boundaries is loaded.

1. Start a new navigation.

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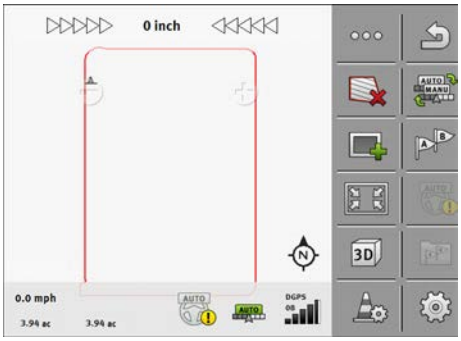
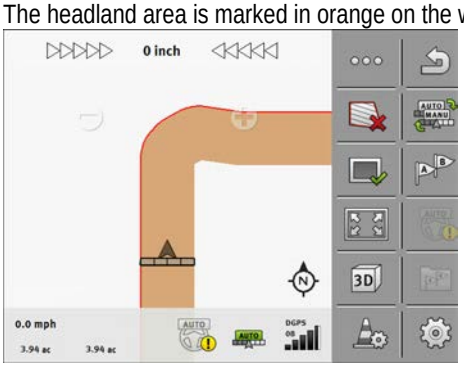
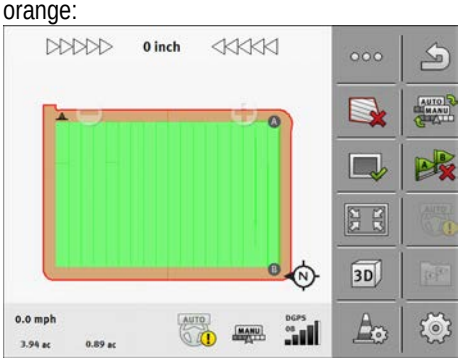
⇨ A field with field boundaries and an unmarked headland is displayed.



2. - Call up the parameters for the headland.
   ⇨ The parameters are displayed.
3. Enter the parameters.
4. - Exit the screen.
   ⇨ The headland area is marked in orange on the work screen.



5. Apply product in the interior of the field.
   ⇨ Once the product has been applied, the interior of the field is green and the headland orange:



6. - Activate parallel guidance in the headland.
   ⇨ - is displayed in the work screen.

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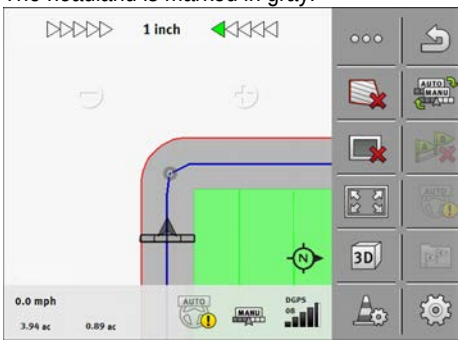
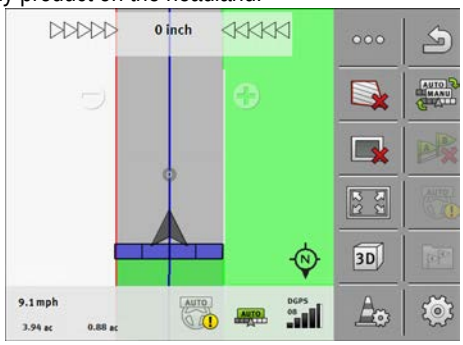
⇨ The headland is marked in gray.



⇨ Guidance lines are displayed in the headland.

7. Apply product on the headland.

⇨



6.9 Marking obstacles

When there are obstacles in your field, you can mark their position. In this way, you will always receive a warning before any collision can occur.

You can mark obstacles while working in a field.

You will be warned of an obstacle in the following cases:

- If the obstacle will be reached in 20 seconds or less.
- If the distance between the obstacle and the vehicle is smaller than the work width of the agricultural device.

The warning always consists of two elements:

- A graphical warning in the upper left-hand corner of the work screen
  - "Field boundary"
  - "Obstacle"
- Acoustic signal

⚠ CAUTION

Obstacles
The software can warn you about obstacles. It cannot brake nor avoid the obstacles.

Function icon	Meaning
	Calls up additional function symbols.

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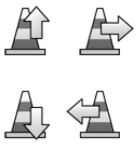
Function icon	Meaning
	Creates a new obstacle.
	Deletes all obstacles.
	Deletes the selected obstacle.
	Moves the obstacle.
	Saves the obstacle.

Procedure

☑ You have now started a navigation.

1. - Call up new function icons.
2. - Add an obstacle.
   ⇨ The keyboard will appear.
3. Give a name to the obstacle.
4. - Confirm.
   ⇨ A flashing red point will appear on the terminal screen. This marks the point at which the obstacle can be found. The distance between the obstacle and the GPS receiver will then be displayed.
5. Use the arrow to move the point so that the distances on the terminal screen correspond to those on the field.
6. - Save the position of the obstacles in the field.

⇨ The obstacle now appears on the work screen.

6.9.1 Deleting obstacle markers

Procedure

1. - Press down for three seconds.
   ⇨ All obstacles will be deleted.

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7 Saving data and exchanging with the PC

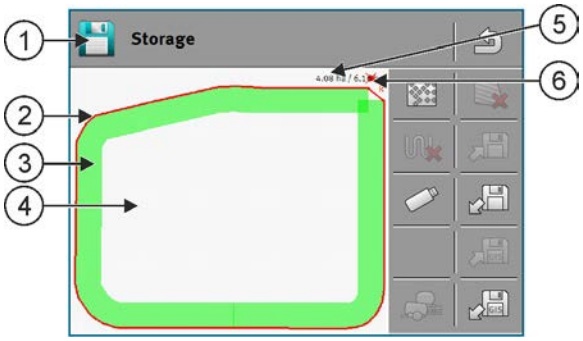
One aim of TRACK-Leader is also to enable the future use of the defined field boundaries, guidance lines and other data.

To do this, you must save the data on the SD card.

In the table in the next chapter, you will find an overview of all function icons that you may need for this purpose.

If you process tasks with the ISOBUS-TC application, you must not save the field data in TRACK-Leader. The data will be automatically saved together with the task in the Taskdata.xml file.

7.1 "Storage" screen



Information on the "Storage" screen

1	Name of the loaded recording	4	Unworked area
2	Field boundary	5	Counters: Unworked areas / entire area
3	Recorded tracks Areas which have been worked.	6	Reference point

Function icons on the "Storage" screen

Function icon	Function
	Opens a menu in which you can load prescription maps.
	Deletes the covered area in the opened recording.
	Deletes the opened recording.
	Saves the opened recording in the ngstore directory. Storage location: SD card
	Loads a stored recording from the ngstore directory. Storage location: SD card
	Saves the field boundary and obstacle lines in the GIS directory. Storage location: USB memory device

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Function icon	Function
	Loads the field boundary and obstacle lines from the GIS directory. Storage location: USB memory device
	Opens the "USB memory device import/export" screen so that files can be copied between the SD card and USB memory device.
	If the connected ISOBUS job computer works with several working widths, this button serves to switch the display between the work results of both working widths.

7.2 Importing and exporting data

To exchange data saved with the TRACK-Leader between the SD card and a PC or another touch terminal, you can:

- Import data from a USB memory device onto the SD card;
- Export data from the SD card to the USB memory device.

When copying the files, the files on the target memory drive are overwritten.

NOTICE
Data formats on touch and button terminals are not compatible You can only exchange files from the ngstore directory between several touch terminals. The data will not work on a button terminal.

When importing and exporting, only the "NgStore" directory is copied between the SD card and the USB memory device.

The "GIS" and "applicationmaps" directories are only found on the USB memory device and cannot be transferred to the SD card.

Procedure

This is how to import and export files:

1. On the start screen of the TRACK-Leader application, tap on "Storage".
2. - Open the "USB memory device import/export".
   ⇨ The "USB memory device import/export" screen appears.
3. If you want to copy files from the USB memory device to the SD card, tap on "Export to the USB memory device".
4. If you want to copy files from the SD card onto the USB memory device, tap on "Import from USB memory device".
   ⇨ The following message appears: "Do you really want to overwrite the data?"
5. Confirm to copy the files.

7.3 Changing over to the touch terminal

If you have been working with a button terminal (e.g. TRACK-Guide II) until now and now want to change over to the touch terminal, pay attention to the following for the transfer of the data:

- Data from the "ngstore" directory are not compatible with both terminals. If you have always saved the covered areas on a USB memory device with the button terminal, you can no longer

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transfer them without losing information. However, you can import the field boundaries, obstacles and guidance lines. You can find the instructions below.

- The button terminals saved the GIS files in the "Navguideexport" directory (as of SW version 4.9.17, this directory is renamed as "GIS" on the button terminals). If you copy these files into the "GIS" directory, you can import them onto the touch terminal and then load them as GIS.

Procedure

This is how to import field data using the button terminal:

1. On the button terminal, open the TRACK-Leader application and open the "Storage" screen.
2. - Load the recording for a field for which you want to transfer field data.
3. - Export the opened recording in GIS format.
   ⇨ The field data have been saved on the USB memory device in the "navguideexport" directory. As of SW version V04.09.17, the directory is named "GIS".
4. Repeat this procedure for all the fields for which you want to transfer the field data.
5. Connect the USB memory device to a PC.
6. Rename the "navguideexport" directory into "GIS". As of SW version V04.09.17, the directory is already named "GIS".
7. Insert the USB memory device into the touch terminal.
8. Open the "TRACK-Leader" application.
9. Tap "Storage".
10. - Import the file with the required recording.
11. - Save the opened recording.
    ⇨ The field boundary is saved in the ngstore directory.

7.4 Saving the work results

You can save the work results in two ways, depending on what you need the work results for:

- Ngstore – Here, the navigation with all work results (covered area, markings, field boundaries, obstacles) are saved. This directory serves to use the data on the terminal for future work or to view the work results with TRACK-Guide Desktop.
- GIS – Here, the work results are saved as a shp file. This data is used to open the field with GIS applications or with Farm Management Information System software. When you open this file on the PC, it contains all of the field data. If you open the same file with the terminal, it only contains the field boundaries and obstacles.

7.5 Loading navigation or field boundary

Procedure

1. On the start screen of the TRACK-Leader application, tap on "Storage".
2. Tap on .
   ⇨ The "Load record" screen appears.

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⇨ You will see a list with recordings that you have saved in the "ngstore" directory. Under each name, you will see the distance from your current position.

3. Tap on to sort the files alphabetically, or on to sort them according to the distance from your position.
   ⇨ The file names are being sorted.
4. Tap on the name of the recording that you want to load.

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8 Editing prescription maps with VARIABLE-RATE Control

A prescription map is a detailed map of a field. In this map the field is split up into areas. The prescription map contains information on how intense the work in each area shall be.

Mode of operation

When the prescription map has been loaded, the software checks via GPS coordinates of the vehicle what application rates are needed according to the prescription map and transfers this information to the ISOBUS job computer.

8.1 Basic processes

To be able to work with prescription maps in *.shp format, you need to:

1. Create a prescription map on the PC.
2. Copy the prescription map to the USB memory device.
3. Import the corresponding prescription map using TRACK-Leader.
4. Adjust the prescription map for the current requirements.

In the following chapters you will learn how to perform these steps.

8.2 Creating prescription maps

You can create a prescription map in the Farm Management Information System or using other PC applications.

Each prescription map must include at least the following files:

- Shp
- Dbf
- Shx

8.3 Copying prescription maps to the USB memory device

Copy all prescription maps to folder "applicationmaps" on the USB memory device.

8.4 Importing prescription maps

You can import a prescription map created on a PC from the USB memory device.

Import the prescription map before starting work.

Procedure

☑ All prescription maps that you want to import are stored on the USB memory device in the "ApplicationMaps" directory.

1. - Open the TRACK-Leader application.
2. Tap "Storage".
3. Tap:
   ⇨ The "Prescription maps" screen appears.
4. Tap:
   ⇨ The "Choose file" screen appears.

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5. Tap the name of the prescription map that you want to import.
6. - Load the marked prescription map.
   ⇨ The "Column" screen appears. It contains all of the columns with data from the prescription maps.
7. Tap the line that contains the target rates.
   ⇨ The "Unit" screen appears.
8. Tap the unit in which the target rate should be transmitted.
9. - Confirm.
10. The "Prescription maps" screen appears.

8.5 Adjusting prescription maps to current needs

After importing the prescription map, you can:

- Change all values by a certain percentage point.
- Change selected values by an absolute number.

Procedure

This is how you change all values at once:

☑ You have chosen a prescription map.

☑ The "Prescription maps" screen has been called up.

☑ You can see a prescription map on the screen.

1. Tap
2. Enter by how many percentage points all target rates should be changed. Using the +/- symbol, you can define whether the target rate should be increased or reduced.
3. - Confirm.
   ⇨ The "Prescription maps" screen appears.

⇨ In the "Rate" column, all values will be adjusted by the entered percentage points.

Procedure

This is how you change a selected value:

☑ You have chosen a prescription map.

☑ The "Prescription maps" screen has been called up.

☑ You can see a prescription map on the screen.

1. In the "Rate" column, tap the value that you want to change.
   ⇨ The keyboard appears.
2. Enter the new value.
3. - Confirm.
   ⇨ The "Prescription maps" screen appears.

⇨ The new value appears in the cell you have changed.

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9 TRACK-Leader TOP automatic steering

WARNING

- Read the enclosed "PSR ISO TOP" directions for use before beginning to use the system. Pay particular attention to the information in the Chapter "Safety".
- Proceed with extreme care, particularly when using the automatic steering!
- Disable the automatic steering whenever anyone comes within 50 meters of the vehicle or farming device while it is operating.

Icon	Function	This is what happens after tapping
	Automatic steering is not possible. This may be due to the following reasons: ▪ No steering job computer is connected. In this case, the icon is grayed out. ▪ The steering job computer has blocked the function due to an error message. ▪ You have not laid out a guidance line.	Nothing
	Changes the work mode of the automatic steering	You can see the current status in the counters area: - Automatic steering is activated - Automatic steering is deactivated.
	Steers the vehicle to the left.	
	Steers the vehicle to the right.	

9.1 Driver tasks

The driver must perform the following tasks:

- The driver must pay attention to safety. The automatic steering system is blind. It cannot tell if anyone is approaching the vehicle. It cannot stop or take evasive action.
- The driver must brake and accelerate.
- The driver must perform turning.

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9.2 Activating and deactivating automatic steering

WARNING

Risk of traffic accident
If automatic steering is ON, the vehicle may drive off the road and cause an accident. This may lead to human injury, or even fatalities.

- Disable the automatic steering before traveling on public roads.
- Move the steering motor away from the steering wheel.

The automatic steering does not operate in the following cases:

- In "Circle" guidance mode;
- When guidance lines in the headland are activated.

You will need to steer the vehicle manually in these situations.

Procedure

You can activate automatic steering as follows:

☑ You must have configured the steering job computer and TRACK-Leader TOP.

☑ You must have laid out the guidance lines.

☑ You must have positioned the vehicle on a line of travel, and enabled a guidance line.

☑ The automatic steering is deactivated. The work screen displays the icon

1. Move the steering wheel motor to the steering wheel. (Only for systems with a steering wheel motor.)
2. Tap:

   ⇨ The icon

is replaced with the following icon:

   ⇨ The automatic steering is enabled.
3. When driving in the vehicle, the steering wheel motor controls the vehicle in such a way that it proceeds along the active guidance line.

Procedure

To deactivate the automatic steering:

1. Tap

.
   ⇨ The work screen displays the following icon:

   ⇨ The automatic steering will be disabled.

9.3 Moving guidance lines

The automatic steering drives the vehicle along the active guidance line.

If the guidance line activated no longer matches the real position of the vehicle due to a GPS signal drift, you can manually move the guidance line.

You have two options:

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- You can move the guidance line for one drive over the field. After turning, the old position will be restored.
- You can move the guidance line permanently.

Procedure

This is how you move the guidance line for one drive:

☑ The automatic steering is enabled.

1. On the work screen, tap: ○○○
   ⇨ New function symbols appear.
2. Tap or to steer the vehicle.
   ⇨ Information is displayed below the header row about how far and in which direction the guidance line will be moved: For example, ">4cm" means that the vehicle will be steered 4cm to the right of the guidance line.
   ⇨ The vehicle will drive parallel to the guidance line until another guidance line is activated.

Procedure

This is how you will move the guidance line permanently:

See chapter: Moving guidance lines [→ 30]

9.4 Turning

When turning, the driver must take control of the steering and steer himself.

Procedure

You can make a turn as follows when automatic steering is enabled:

1.

- Deactivate the automatic steering.
   ⇨ The work screen displays the icon

. The automatic steering is deactivated.
2. Take control and perform the turn yourself.
   ⇨ The next guidance line is then activated if the angle between itself and the vehicle is smaller than the set "Line acquisition angle" parameter.
3.

- Activate automatic steering as soon as the next guidance line is activated.

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10 Cooperation with other applications

10.1 Cooperation with the ISOBUS-TC application

You can use TRACK-Leader together with the ISOBUS-TC application.

This has the following advantages:

- You do not need to load or import any field data with TRACK-Leader. If you start a task in ISOBUS-TC, all field data will be directly transferred to TRACK-Leader.
- You can work by using prescription maps that are integrated in a task.

If you are using both applications, please note the following:

1. Always start the task in the ISOBUS-TC application when working with TRACK-Leader.

Activating and deactivating cooperation with ISOBUS-TC

If you do not want to use the ISOBUS-TC application, deactivate the processing of ISO-XML tasks:

1. Open the ISOBUS-TC application.
2. Tap "Settings".
3. Configure the "Work with ISO-XML?" parameter.
4. Restart the terminal.

10.2 Cooperation with job computers

If you want to switch the sections with the job computer, you must activate the SECTION-Control [➙ 54] function.

In this case, TRACK-Leader adopts almost all of the parameters for the connected implement from the ISOBUS job computer.

For example:

- Swathwidth
- Number of sections
- Geometry of the implement

The job computer receives the following information from TRACK-Leader:

- Commands to switch on/off sections (SECTION-Control)
- Target rate (from the prescription map or from an ISO-XML task)

10.3 Cooperation with TRACK-Guide Desktop

TRACK-Guide Desktop is a free program for PCs.

This allows you to:

- View work results
- Print reports for your customers

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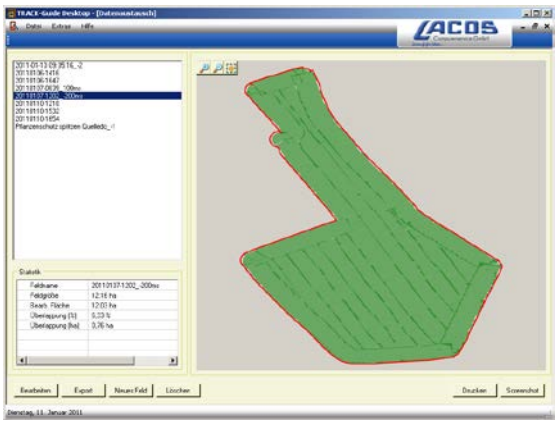
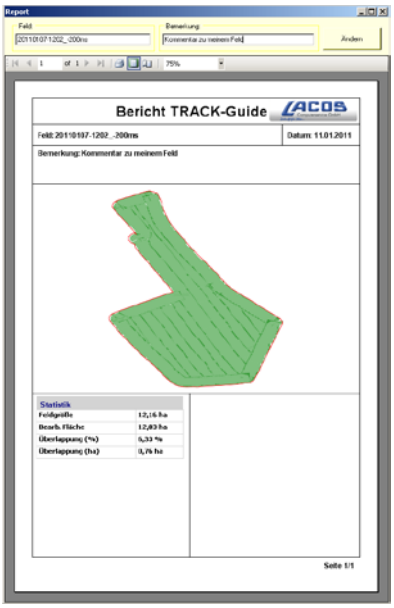


Program window



Report

You can find TRACK-Guide Desktop in the "Download" section of the website below: www.lacos.de

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11 Configuration

This chapter clarifies all settings which you have to configure.

All configuration parameters can be found in the "Settings" screen. These are divided into the following groups:

- General - Parameters which affect all of the TRACK-Leader modules.
- TRACK-Leader - Parameters with which you can configure the parallel route. They are therefore required for all modules.
- SECTION-Control - Parameters which are used for automatic section switching.
- TRACK-Leader TOP - Parameters for TRACK-Leader TOP automatic steering
- Demo - A demonstration video.
- Machine profiles - Saved profiles for machines and vehicles in your fleet.

One of the groups is always grayed out: "SECTION-Control" or "Machine profiles". Which one this is depends on how you configure the "SECTION-Control" parameter in the "General" group.

You have to configure the following

Module	Chapter
TRACK-Leader	Configuring "General" settings [➞ 54] Configuring TRACK-Leader [➞ 55]
SECTION-Control	Configuring "General" settings [➞ 54] Configuring TRACK-Leader [➞ 55] Configuring SECTION-Control [➞ 56]
TRACK-Leader TOP	Configuring "General" settings [➞ 54] Configuring TRACK-Leader [➞ 55] Configuring TRACK-Leader TOP [➞ 67]
VARIABLE RATE-Control	No additional settings are needed

Icon for the configuration

Icon	Meaning
	Yes
	No

Procedure

This is how you open the configuration screens:

1. - Open the TRACK-Leader application.
2. Tap "Settings".
   ⇨ The "Settings" screen will appear.
3. Tap the buttons to configure the application.

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11.1 Configuring "General" settings

In this menu you can set the display on the screen and activate some functions.

SECTION-Control

This parameter determines whether automatic section switching is activated or deactivated.

Potential values:

- "Yes"
  SECTION-Control is activated. Machine data such as the swathwidth are automatically transferred from the connected job computer.
  Precondition: An ISOBUS job computer must be connected.
- "No"
  SECTION-Control is deactivated. Only the TRACK-Leader parallel guidance is activated.
  If no ISOBUS job computer is connected, you must create a profile for each implement. See: Machine profiles [➙ 67]

TRACK-Leader TOP

With this parameter, you can activate the support of the Reichhardt TRACK-Leader TOP automatic steering.

Potential values:

- "Yes"
  Automatic steering is activated.
- "No"
  Automatic steering is deactivated.

Acoustic warnings

This parameter determines whether a warning tone sounds when in the vicinity of field boundaries and recorded obstacles.

Potential values:

- "Yes"
- "No"

Show grid

Displays a grid on the navigation screen.

The distances between the grid lines will differ according to the input work width. The grid lines are aligned along the North-South and East-West axes.

Map orientation

This parameter defines what should be rotated when steering is applied: the background map or the vehicle icon.

Potential values:

- "Vehicle fixed"
  The vehicle icon on the display screen remains immobile.

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- "Field fixed"
  The vehicle icon on the display screen moves. The background map remains immobile.

Smoothen course

If the GPS receiver mounted on the roof of the tractor cab swings sharply, the tracks displayed on the screen can appear very jagged.

The "Smoothen course" option smoothens out the displayed tracks.

The requirements differ depending on the GPS receiver.

Potential values:

- "Yes"
  - DPGS receiver A100 or A101

    If you are using TRACK-Leader TOP and the receiver is connected to the steering job computer.
  - DGPS/Glonass receiver AG-STAR or SMART-6L

    Always.
- "No"
  - DGPS receiver A100 or A101

    If you are not using TRACK-Leader TOP and the receiver is connected to the terminal.

11.2 Configuring TRACK-Leader

Sensitivity

Sets the sensitivity of the light bar.

How many centimeters of deviation are required for a LED to light on the light bar?

- Default: 30cm
  This value means a sensitivity of 15cm to the left and 15 cm to the right.

Preview

This parameter determines the number of meters in front of the vehicle at which the preview display of the screen light bar will calculate the future position of the vehicle.

- Default value: 8 m

Line acquisition angle

The program assumes from a defined angle that the vehicle wants to swing to a guidance line. This guidance line will be then marked in blue. If the vehicle drives with smaller angle deviation towards a guidance line, then this track will not be recognized as a new current guidance line.

- Default value: 30 degrees.
- Value for TRACK-Leader TOP: 85 degrees

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11.3 Configuring SECTION-Control

In this configuration step, you will configure the section switching for your ISOBUS job computer.

The application recognizes every ISOBUS job computer by means of its ISO-ID and sets up an individual profile for each of these. You can therefore configure different parameters for your fertilizer applicator and for your seeder or sprayer.

Procedure

☑ The "SECTION-Control" parameter in the "General" menu is activated.

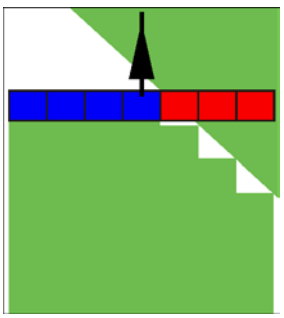
1. - Open the TRACK-Leader application.
2. Tap "Settings".
3. Tap "SECTION-Control".
   ⇨ A list of the profiles of all ISOBUS job computers that have been connected to the terminal is shown. A new profile will be created whenever you connect a new ISOBUS job computer to the terminal.
4. Tap the name of the ISOBUS job computer for which you want to configure SECTION-Control. The connected job computer is marked with a green point.
5. - Open the list of parameters.
   ⇨ A list with the set parameters appears.
6. Change the parameters. You will find explanations of these on the following pages.

Parameters for SECTION-Control

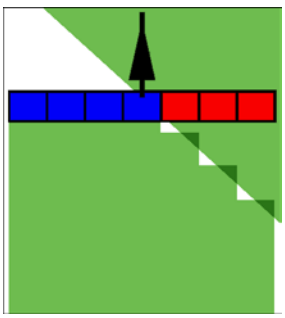
Degree of overlap

The degree of overlap when processing a wedge-shaped area.

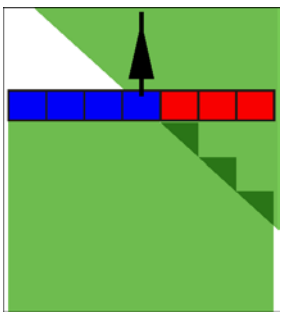
The set "Degree of overlap" is influenced at the outer sections by means of the "Tolerance of overlap" parameter.



0% degree of overlap



50% degree of overlap



100% degree of overlap

Potential values:

- 0% – When exiting a processed area, each section is only switched on when the vehicle has completely exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 1% over the processed area.
- 50% – When exiting a processed area, each section is only switched on when 50% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when

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the section extends up to 50% over the processed area. At a "Degree of overlap" of 50%, the "Tolerance of overlap" function has no effect.

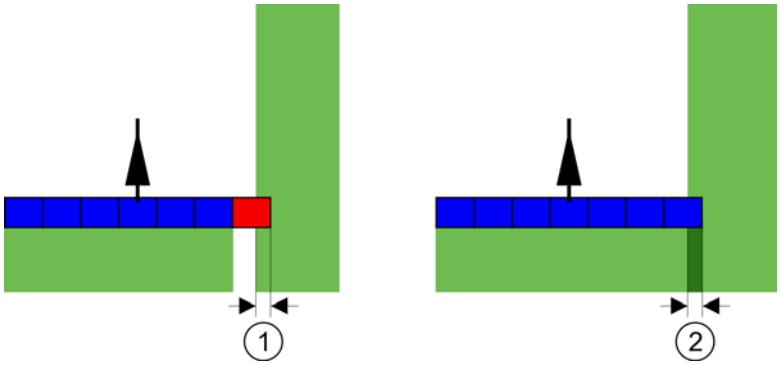
- 100% – When exiting a processed area, each section is only switched on when 1% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 100% over the processed area.

Tolerance of overlap

Use this parameter to define a permissible overlap. The outer sections are only activated when the overlap is greater than the value of this parameter.

The "Tolerance of overlap" only applies to the outermost left and right sections. The other sections are not affected by this parameter.

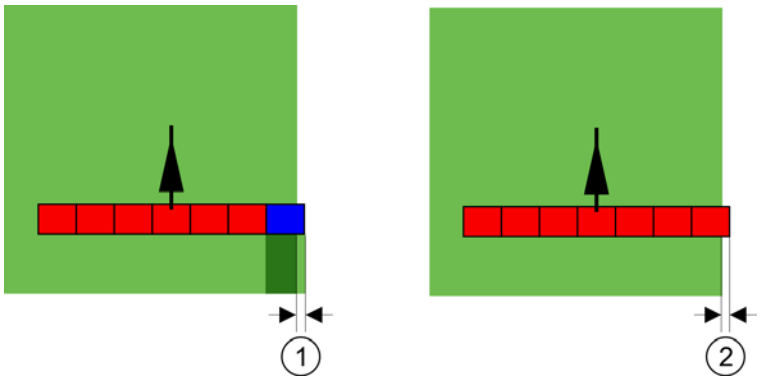
The following illustrations show how the "Tolerance of overlap" parameter acts with a "Degree of overlap" of 0%. The set tolerance of overlap can be seen underneath the illustrations.



Tolerance of overlap for 0% degree of overlap – in both cases the work was done with a 25 cm overlap.

1	Tolerance of overlap 0 cm In this case, the section is immediately switched off.	2	Tolerance of overlap 30 cm In this case, the section is not switched off, as the current overlap is lower than 30cm.

If you have set the "Degree of overlap" parameter to 100%, the "Tolerance of overlap" parameter plays a vital role when leaving an area already processed. This is relevant for example when turning on a headland that has already been processed.



Tolerance of overlap for 100% degree of overlap – in both cases the processed area was exited by 25 cm.

1	Tolerance of overlap 0 If only 1% of the section exits the area that has already been processed, the entire section will be switched on.	2	Tolerance of overlap 30 cm The tolerance of overlap enables the prevention of unnecessary overlaps. The right section is only switched on when the processed area is exited by more than 30 cm.

Potential values:

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- Recommendation: Set the "Tolerance of overlap" to 30 cm when using the A100 GPS receiver.
- Tolerance 0 cm
  The outermost section is switched on or off when the track being traveled is entered or exited.
- Other value
  The outermost section is switched on or off when the overlap exceeds the value.
- Maximum value
  Half of the section width of the outermost section.

Field boundary overlap tolerance

Use this parameter to prevent sections from being activated at the field boundary in the event of a minimum overlap.

This parameter functions in the same way as "Tolerance of overlap", but is only applied when the field boundary is exceeded.

Before making any change to this distance, make sure that this is safe for the environment and the surroundings under current circumstances.

Overlapping nozzles (EDS)

This parameter is only applicable to sprayers with an individual nozzle switching function. This is not even displayed on other systems.

Use the parameter to set the number of nozzles which should operate in overlapping mode.

Delay

Delay is the period of time that elapses between the transmission of an order by the terminal and the implementation of the order by the implement.

This time can differ for each implement.

There are two parameters for the configuration:

- "Delay on start" (when switching on)
- "Delay on stop" (when switching off)

If you have an ISOBUS job computer which transfers delay times to SECTION-Control, you must not change these parameters. In this case, the text "ISO" will appear a value.

Example

If a section of a sprayer passes over an area that was already processed, it must be immediately switched off. To do this, the software sends a signal to the section valve to switch off. This causes the valve to be shut off and the pressure in the hose drops. This lasts until there is no further flow from the nozzles. The duration is approx. 400 milliseconds.

As a result, the section applies an overlap for a period of 400 milliseconds.

In order to prevent this, the "Delay on stop" parameter must be set to 400 ms. Now, the signal is sent to the section valve 400 milliseconds earlier. As a result, the application can be interrupted or restarted at exactly the right moment.

The following illustration shows how the delay function works. The illustration shows actual behavior, not the display on the screen.

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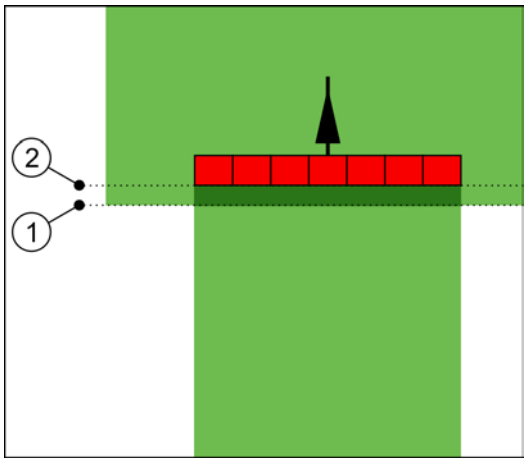

Delay on stop is set to 0. If the set delay time is too brief, it results in overlapping application.

1	At this point, the section valve has received a signal to shut off.	2	At this point, the sprayer stopped application.

Potential values:

- "Delay on start"
  Enter the delay when switching a section on. If the section reacts too late to the switch-on signal, increase the value.
  e.g.
  - 400 ms solenoid valve
  - 1200 ms electrically actuated valve
- "Delay on stop"
  Enter the delay when switching a section off. If the section reacts too late to the switch-off signal, increase the value.
  e.g.
  - 300 ms solenoid valve
  - 1200 ms electrically actuated valve

Machine model

This parameter determines the way and means in which the working bar should track the GPS receiver.

Potential values:

- "self propelled"
  Settings for self-propelled agricultural equipment.
- "trailed"
  Settings for agricultural equipment towed by a tractor.
- "deactivated"
  Settings for attached devices.

Screen light bar

Screen light bar type.

Potential values:

- "Deactivated"
  Deactivates the screen light bar

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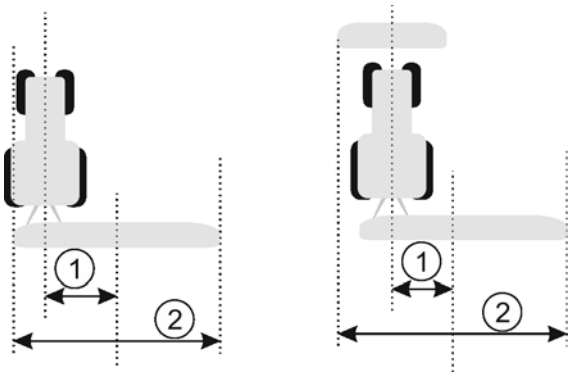
- "Graphic Mode"
  Activates screen light bar in graphic mode
- "Textmode"
  Activates screen light bar in text mode
- "SECTION-View"
  Activates SECTION-View

Implement offset

You can use this parameter to adjust the offset of the working width towards the left or the right. Enter the number of cm by which the center of the working width is shifted from the center of the tractor.



Left: Tractor with an implement; Right: Tractor with two implements

1	Implement offset: Distance between the center of the tractor and the center of the total working width.	2	Total working width

Potential values:

- Enter a positive value, e.g.: 90 cm
  If the equipment is offset to the right.
- Enter a negative value, e.g.: -90 cm
  If the equipment is offset to the left.

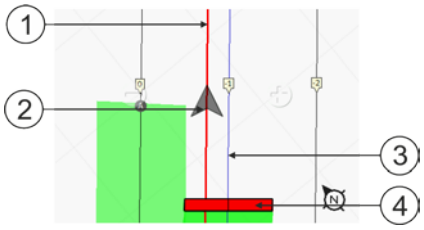
Mode of operation

If this parameter is allocated any value other than 0, the following occurs:

- A red guidance line appears on the work screen, which is drawn at a distance from the blue guidance line.
- The working bar is shifted to one side. The blue guidance line runs exactly in the middle.

After setting the implement offset, you have to operate the TRACK-Leader slightly differently:

1. Steer the vehicle such that the arrow is always following the red line. The center of the working bar then follows the blue guidance line.



Guidance lines for implements with offset

1	Red guidance line - marks the center of the tractor	3	Blue guidance line - marks the center of the working width
2	Arrow - marks the position of the GPS receiver	4	Working bar

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11.3.1 Calibrating Delay on start and Delay on stop

This chapter is intended for advanced users.

Before reading the chapter:
- Learn how to operate the terminal.
- Learn how to operate the SECTION-Control.

The standard values of parameters "Delay on start" and "Delay on stop" are set for work with most sprayers.

When should you calibrate?

These parameters must be calibrated in the following cases:
- If using a different agricultural device with SECTION-Control.
- If the agricultural device switches too late or too early when driving on an area where the product has been already applied.
- If the agricultural device switches too late or too early when leaving an area already where the product has been already applied.

In the chapters below you will learn how to calibrate the parameters.

The chapters and examples apply to the example of a sprayer. For different agricultural devices, please proceed accordingly.

Calibration phases

Calibration consists of several phases:

1. Calibration preparations
2. Traveling the field for the first time
3. Traveling the field for the second time
4. Marking the application borders
5. Calculating correction values
6. Correcting the "Delay on start" and "Delay on stop" parameters

The phases are explained in detail in the following chapters.

Calibration preparations

You will need the following equipment and personnel in order to perform the calibration:
- Two observers – two people who will mark the areas where the product has been already applied with stakes.
- Tools for marking the areas where the product has been applied:
  - Barrier tape, approx. 200 - 300m
  - 8 stakes for marking on the field
- Sprayer with tank loaded with clean water.

First travel

In this phase of the calibration, you will need to travel across the field along a single track.

The illustration below shows the points which must be marked before and after the travel. Instructions on how to do this are given beneath the illustration.

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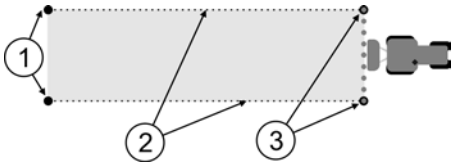

Results of the first travel

1	Stakes To mark the outer ends of the sections prior to travel	3	Stakes To mark the outer ends of the sections after travel
2	Barrier tape between the stakes To mark the borders of travel		

Procedure

To prepare the field for delay calibration:

1. Start a new navigation with SECTION-Control.
2. Position the sprayer at the start of the travel. The travel must not be positioned close to the field boundary, in order to give you sufficient space for the second travel.
3. Extend the boom.
4. Mark the ends of the outer sections with stakes.
5. Travel 100 to 200 meter in a straight line before beginning to apply the clean water.
6. After 100 to 200 meter, stop and switch off the sprayer.
7. Save the travel in the TRACK-Leader. This will enable the calibration to be repeated.
8. Mark the ends of the outer sections with stakes.
9. Connect the stakes with barrier tape. This marks the borders of travel across the field.
10. Fix the barrier tape to the ground with stones or earth.

⇨ You have now performed the first travel, and marked the application borders.

Second travel

In this phase, you will need to apply the product over the area which you traveled through in the first travel at a 90° angle.

CAUTION

Injury from the driving sprayer

Observers who are assisting with the calibration are at risk of being struck by the boom.

- The observers should be made properly aware of this risk. Such hazards should be explained to them.
- Ensure that the observers maintain a sufficient distance from the spray boom at all times.
- Stop the sprayer immediately if an observer is too close to the sprayer.

In this phase, you will require the help of one or two more people. These people will observe the travel and the behavior of the sprayer, and mark out the application borders.

They should be appropriately trained and warned of the potential dangers.

The illustration below shows where the observers must stand and the objectives that they must achieve.

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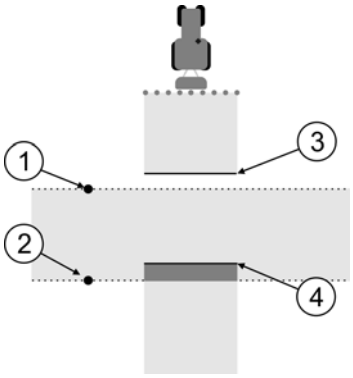

Travel 2

1	Position of Observer 1	3	This line marks the position at which the nozzles should begin spraying when the vehicle exits the area where the product has been applied.
2	Position of Observer 2	4	This line marks the position at which the nozzles should stop spraying when the vehicle enters the area where the product has been applied.

Procedure

☑ The tank is filled with clear water.

☑ The observers should stand at a safe distance from the boom of the sprayer.

☑ Navigation is started using the first travel.

☑ SECTION-Control should be in automatic mode.

1. Position the sprayer at a distance of approx. 100 meter from, and an angle of 90° to the traveled area.
2. Drive at a constant speed (e.g.: 8 km/h) over the area where the product has been already applied. Apply the water as you do so.
3. The observers must stand on the previously marked travel borders at a safe distance from the boom.
4. The observers must observe the points at which the sprayer stops and starts spraying, as it passes along the already traveled points.

⇨ You will now know how the sprayer behaves when traveling along an area where the product has been already applied.

You may wish to repeat this process several times in order to ensure better accuracy of the results.

Marking the application borders – for Delay on stop

In this phase, you will need to mark where your sprayer stops application when you enter an area where the product has been already applied. You must also determine where application should stop in future.

This will tell you whether the sprayer is switching off too early, or too late.

The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on stop" parameter.

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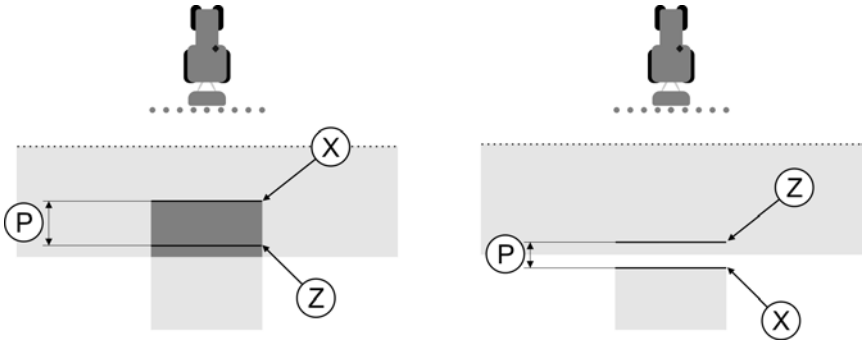


Lines for the "Delay on stop" parameter. Left: Sprayer switches off too late. Right: Sprayer switches off too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer stops application.
		Z	Desired application line This is where the sprayer should stop application. A slight overlap of 10cm should be planned due to the pressure release time.

In both cases (left and right), the "Delay on stop" parameter is incorrectly set:

- Left: Sprayer switches off too late. The delay period must be extended.
- Right: Sprayer switches off too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

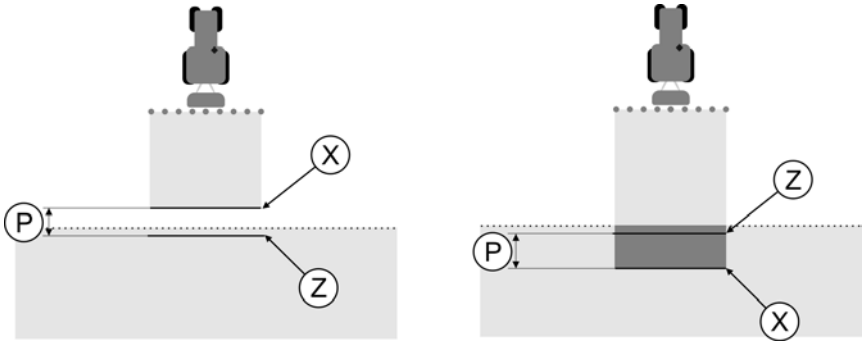
⇨ You now know whether the sprayer is switching off too early, or too late.

Marking the application borders – for Delay on start

In this phase, you will need to mark where your sprayer begins application when you exit and where the product has been already applied. You must also determine where application should begin in future.

This will tell you whether the sprayer is switching on too early, or too late.

The illustrations below show the lines which you will need to mark in the field in order to be able to calculate the "Delay on start" parameter.



Lines for the "Delay on start" parameter. Left: Sprayer switches on too late. Right: Sprayer switches on too early.

P	Distance between desired application line Z and actual application line X	X	Actual application line This is where the sprayer begins application.
		Z	Desired application line This is where the sprayer should begin application. A slight overlap of 10cm should be planned due to the pressure build-up time.

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In both cases (left and right), the "Delay on start" parameter is incorrectly set:
- Left: Sprayer switches on too late. The delay period must be extended.
- Right: Sprayer switches on too early. The delay period must be reduced.

Procedure

1. Compare the markings in the field with the calculations.

⇨ You now know whether the sprayer is switching on too early, or too late.

Calculating correction values

In the final phase, you have determined:
- Which parameters must be altered.
- Whether the current delay must be increased or reduced.

You must now calculate the number of milliseconds by which to adjust the incorrectly set parameter.

To do this, you will need to calculate a so-called correction value.

In order to be able to calculate the correction value, you need to find out how fast the sprayer was travelling. This speed must be entered in inch/milliseconds.

The following tables lists a number of speeds and their conversion into cm/ms:

Speed in km/h	Speed in cm/ms
6 km/h	0.16 cm/ms
8 km/h	0.22 cm/ms
10 km/ h	0.28 cm/ms

Procedure

The correction value should be calculated as follows:

1. [Distance P] : [Speed of sprayer] = Correction value
2. The currently set "Delay on start" or "Delay on stop" parameter must then be corrected by this value.

Changing the delay parameter

You must now adjust the "Delay on start" and 'Delay on stop" parameters.

Procedure

1. Alter the parameters using the following rule of thumb:
   - If the sprayer switches on too late, it needs more time. The delay period must be extended.
   - If the sprayer switches on too soon, it needs less time. The delay period must be reduced.
2. Calculate a new value for the delay parameter.
   Perform this step separately for the "Delay on start" or "Delay on stop"
   If the sprayer switches on or off too late:
   Extend the current delay period by the correction value
   If the sprayer switches on or off too early:
   Reduce the current delay period by the correction value

Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

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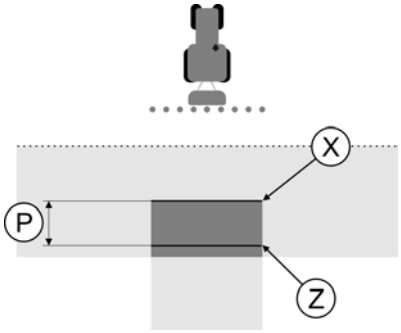
The sprayer was switched off too late when traveling over an area where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:



When travelling over the area where the product has been already applied, the sprayer switched off too late

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay parameter.
   As the sprayer switches off too late, "Delay on stop" must be increased by the correction value:
   364 (correction value) + 450 (set "Delay on stop") = 814 (new "Delay on stop")
3. Insert value 814 for the "Delay on stop" parameter.

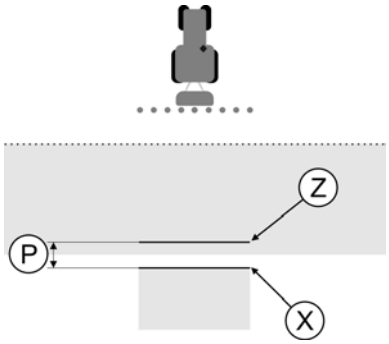
Example

A sprayer traveled at a speed of 8 km/h. This corresponds to 0.22 cm/ms.

After the second travel, the distance P was measured. The distance was 80cm.

The "Delay on stop" parameter is currently set to 450ms.

The sprayer switched off too early when traveling over an are where the product has been already applied. Point Z lied in front of Point X along the direction of travel. The lines were marked as in the illustration below:



When traveling over an area where the product has been already applied, the sprayer switched off too early.

1. Calculate the correction value:
   [Distance P]: [Speed of sprayer] = Correction value
   80 : 0,22 = 364
2. Calculate a new value for the delay on stop parameter.
   As the sprayer switches on or off too early, "Delay on stop" must be decreased by the correction value:
   450 (set "Delay on stop") - 364 (correction value) = 86 (new "Delay on stop")
3. Insert value 86 for the "Delay on stop" parameter.

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11.4 Configuring TRACK-Leader TOP

The following parameters must be set in order to use TRACK-Leader TOP:

GPS receiver height

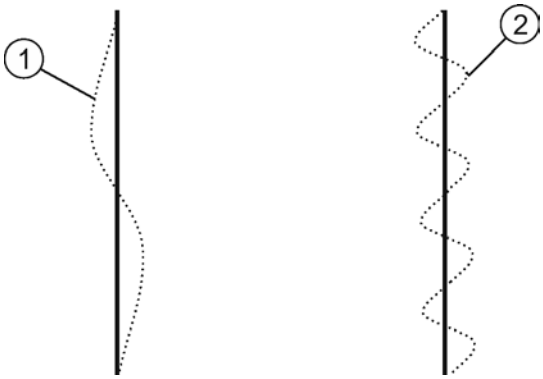
Distance between GPS receiver and the ground.

Required for: TRACK-Leader TOP

PSR reaction speed

PSR reaction speed and aggressiveness of the automatic steering. The higher the value, the sharper the steering movements.

The aim of these settings is to ensure that the vehicle finds the track fast enough, but still drives calmly and does not over-steer constantly.



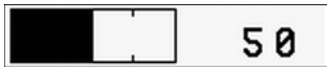
Examples of different PSR reaction speeds

1	The steering responds too slowly	2	The steering responds too rapidly

You can adjust the value to specific local conditions prior to work commencement:

- When the ground is wet and makes steering more difficult, increase the value.
- When the ground is dry and makes steering easy, reduce the value.

The value set here will also appear in the start screen of the PSR application (steering job computer):



11.5 Machine profiles

Each machine for which you use the software can have different parameters. You can create profiles for machine settings, so that you avoid setting the parameters every time you start your work.

In the "Machine profiles" area you can enter the parameters of connected agricultural devices and save them as profiles.

You will need the machine data in the following instances:

- When SECTION-Control is deactivated
- When the terminal is not connected to any job computer.

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11.5.1 Creating new machine profiles

"Machine" here means a combination of a tractor and an agricultural device.

Example

If you have two tractors and two devices in your fleet, you possibly have to create four profiles:

- Tractor A and sprayer
- Tractor B and sprayer
- Tractor A and fertilizer spreader
- Tractor B and fertilizer spreader

Always create all combinations which you actually need as machine profiles. You can save up to 20 machine profiles.

Procedure

☑ The "SECTION-Control" parameter in the "General" menu is deactivated.

1. - Open the TRACK-Leader application.
2. Tap "Settings".
3. Tap "Machine profiles".
4. - Set up a new machine profile.
   ⇨ The keyboard will appear.
5. Give a name to the machine profile.
6. - Confirm.
   ⇨ The "Machine" screen will appear.
7. Configure all of the parameters.
8. - After completing the configuration, exit the screen.

11.5.2 Selecting from machine profiles

Before you start work, you have to select the machine from your fleet. You select the machine from the machine profiles.

Procedure

☑ The "SECTION-Control" parameter in the "General" menu is deactivated.

1. - Open the TRACK-Leader application.
2. Tap "Settings".
3. Tap "Machine profiles".
   ⇨ A list of existing machine profiles will appear.
4. Tap the name of the machine profile that you want to use.
   ⇨ You have now marked the machine profile.
5. If you want to edit the machine profile, or check the settings, tap .
6. - Exit the screen to save the settings.

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11.5.3 Machine parameters

You will need the machine parameters in the following instances:

- When you want to create a machine profile for a new machine
- When you want to edit a machine profile

On the pages below you will find the explanation of all machine parameters.

Name

Name of the machine profile.

Swathwidth

This parameter shows the work width set for a device.

No. of sections

Enter the number of sections that can be switched off on the implement. On a sprayer, they are the section valves; on a fertilizer spreader or a seeder, they can be half widths.

This parameter serves to transmit the proper number of sections to the SECTION-View [➞ 19] module, so that you can switch the sections manually.

Each section appears as part of the working bar on the screen.

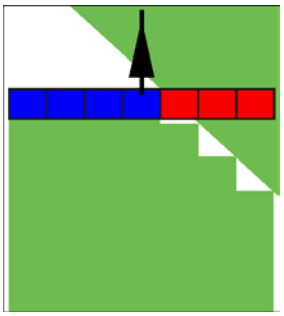
Sections

Opens a screen where you can enter the width of the individual sections on the implement.

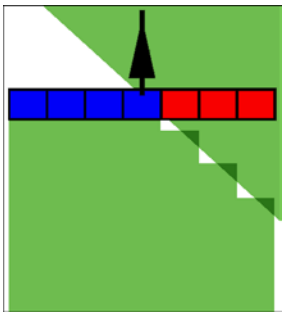
Degree of overlap

The degree of overlap when processing a wedge-shaped area.

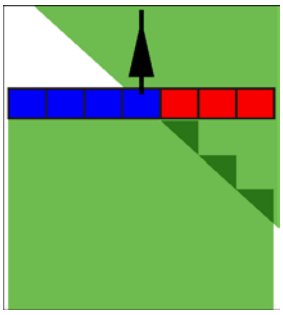
The set "Degree of overlap" is influenced at the outer sections by means of the "Tolerance of overlap" parameter.



0% degree of overlap



50% degree of overlap



100% degree of overlap

Potential values:

- 0% – When exiting a processed area, each section is only switched on when the vehicle has completely exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 1% over the processed area.

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- 50% – When exiting a processed area, each section is only switched on when 50% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 50% over the processed area. At a "Degree of overlap" of 50%, the "Tolerance of overlap" function has no effect.
- 100% – When exiting a processed area, each section is only switched on when 1% of the vehicle has exited the area. When traveling onto a processed area, the section is only switched off when the section extends up to 100% over the processed area.

Tolerance of overlap

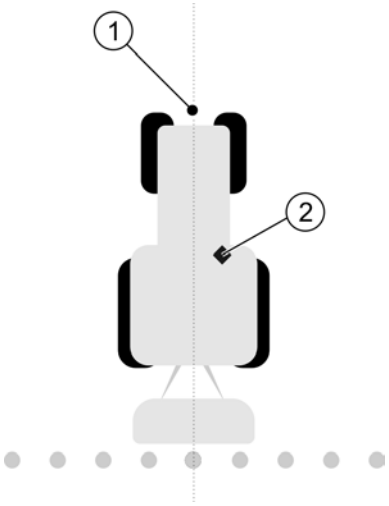
See here [➞ 57]

Field boundary overlap tolerance

See here [➞ 58]

GPS receiver left/right

Here, enter the distance to the left or to the right from the longitudinal axis of the vehicle or tractor on which the GPS receiver is installed.



Position of the GPS receiver

1	Longitudinal axis of the vehicle	2	GPS receiver Is to the right of the longitudinal axis of the vehicle

The position of the GPS receiver which you have entered in the Tractor-ECU application will be ignored by TRACK-Leader if you use the machine profile. You must therefore ignore the values from the Tractor-ECU application at this point.

Potential values:

- Input a negative value, e.g.: - 0.20m
  if the GPS receiver is positioned to the left of the longitudinal axis.
- Input a positive value, e.g.: 0.20m
  If the GPS receiver is positioned to the right of the longitudinal axis.

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GPS receiver front/rear

Distance of the GPS receiver from the treatment point. The treatment point may for example be the boom of a sprayer. For a fertilizer applicator, this is the spreader discs.

The position of the GPS receiver which you have entered in the Tractor-ECU application will be ignored by TRACK-Leader if you use the machine profile. You must therefore ignore the values from the Tractor-ECU application at this point.

Potential values:

- Input a negative value, e.g.: - 4.00m
  if the GPS receiver is positioned to the rear of the treatment point.
- Input a positive value, e.g.: 4.00m
  if the GPS receiver is positioned in front of the treatment point.

Machine model

This parameter determines the way and means in which the working bar should track the GPS receiver.

Potential values:

- "self propelled"
  Settings for self-propelled agricultural equipment.
- "trailed"
  Settings for agricultural equipment towed by a tractor.
- "deactivated"
  Settings for attached devices.

Screen light bar

Screen light bar type.

Potential values:

- "Deactivated"
  Deactivates the screen light bar
- "Graphic Mode"
  Activates screen light bar in graphic mode
- "Textmode"
  Activates screen light bar in text mode
- "SECTION-View"
  Activates SECTION-View

Implement type

Use this parameter to define the type of agricultural device.

The following implement types are available:

- Sprayer
- Fertilizer
- Planter/Seeder
- Harvester
- Non specific system

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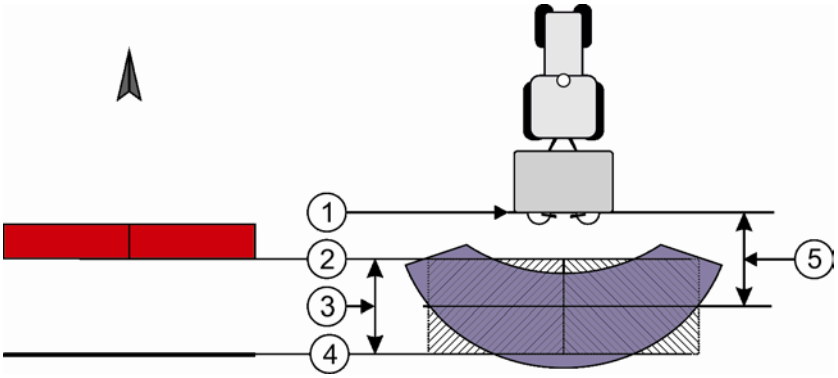
Spread pattern for a fertilizer

If you want to ensure precise application when moving on a headland or a treated area, you can specify a spread pattern for your fertilizer.

Use the following parameter to define the spread pattern for a fertilizer:

- "Spreading distance"
  This is the distance between the spreader discs and the center of the spread pattern.
  Spreading distance = (working length/2) + (distance between the switch-off line and spreader discs)
- "Working length"
  Distance between the switch-off line and switch-on line in the spread pattern.



"Spreading distance" and "Working length" parameters

1	Spreader discs	4	Switch-on line When this line moves away from the headland, the application is started.
2	Switch-off line When this line reaches the headland, the application is stopped.	5	Spreading distance
3	Working length Area between the switch-off line and the switch-on line.		

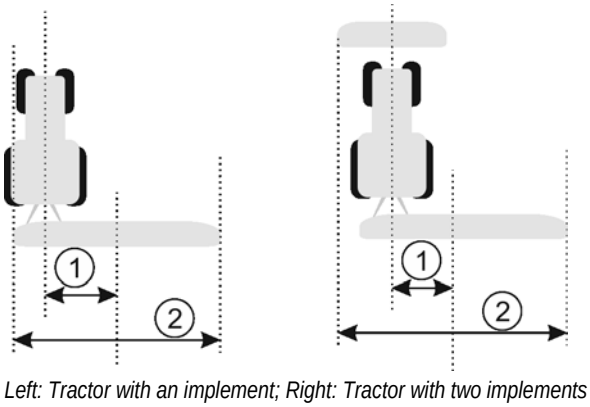
Procedure

This is what you have to do so that the parameters appear in the list:

1. Set the "Implement type" parameter to "Fertilizer".
   ⇨ The "Spreading distance" and "Working length" parameters are displayed in the menu.

Implement offset

You can use this parameter to adjust the offset of the working width towards the left or the right. Enter the number of cm by which the center of the working width is shifted from the center of the tractor.



Left: Tractor with an implement; Right: Tractor with two implements

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1	Implement offset: Distance between the center of the tractor and the center of the total working width.	2	Total working width

Potential values:

- Enter a positive value, e.g.: 90 cm
  If the equipment is offset to the right.
- Enter a negative value, e.g.: -90 cm
  If the equipment is offset to the left.

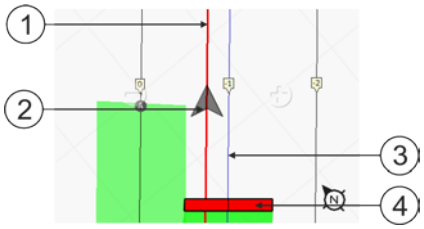
Mode of operation

If this parameter is allocated any value other than 0, the following occurs:

- A red guidance line appears on the work screen, which is drawn at a distance from the blue guidance line.
- The working bar is shifted to one side. The blue guidance line runs exactly in the middle.

After setting the implement offset, you have to operate the TRACK-Leader slightly differently:

1. Steer the vehicle such that the arrow is always following the red line. The center of the working bar then follows the blue guidance line.



Guidance lines for implements with offset

1	Red guidance line - marks the center of the tractor	3	Blue guidance line - marks the center of the working width
2	Arrow - marks the position of the GPS receiver	4	Working bar

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12 Procedure for dealing with error messages

Error message text	Possible cause	How to fix the problem
Caution! The memory could not be initialized. If the problem still persists after a restart, please contact the customer service.	The database could not be created on the data medium.	Restart the terminal.
Active profile cannot be removed!	An attempt was made to delete the currently selected machine profile.	Select a different machine profile and then delete the desired machine profile.
An error has occurred while reorganizing the storage!	The data medium was removed during reorganizing.	Re-insert the data medium and re-start the reorganization
	The data medium is full.	Delete unnecessary data from the data medium and try again.
	The data medium is damaged.	Use a new data medium.
Could not find DGPS configuration file!	The internal file containing the DGPS settings could not be found.	Contact our Service team in order to reinstall the software.
Test phase is expired! Please inform your dealer.	Test phase is expired.	Request a license. Activate the software.
No connected USB memory device!		Insert USB memory device.
Export failed!	The data medium was removed before or during the export.	Re-insert the data medium and re-start the export.
	Writing is not allowed on the data medium.	Disable write protection on the data medium.
	Data medium is full.	Delete unnecessary data from the data medium and try again.
Error!		Contact the Customer service.
GPS signal is not working!	The serial connection to the GPS receiver has been interrupted. The position can no longer be determined.	Check and re-connect the cable connections to the GPS receiver.
GPS signal too weak!	The GPS signal quality is too weak, most likely due to obstructions.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
No DGPS available!	No DGPS is available due to signal obstruction.	Check the mounting of the GPS receiver and your current position. The receiver must be in open view to the sky.
	No DGPS is available due to a failure of	Check the general availability of the

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Error message text	Possible cause	How to fix the problem
	the correction data service, e.g. EGNOS.	service. Check and set the proper EGNOS correction satellites.
No compatible format found for this prescription map. Please create a new format.	No suitable format could be found using the content of the prescription map. No compatible format has been created.	Important formats have been provided. Other formats can be incorporated by the users themselves.
No profile available!	No machine profile is available.	Create a new machine profile.
Could not read DGPS configuration from GPS receiver!	The serial connection to the GPS receiver has been interrupted.	Check and re-connect the cable connections to the GPS receiver.
Could not readout the e-Dif configuration from GPS receiver!	The serial connection to the GPS receiver has been interrupted.	Check and re-connect the cable connections to the GPS receiver.
Could not readout the settings from the tilt module!	The serial connection to the GPS TILT module has been interrupted.	Check and re-connect the cable connections.
Saving failed!	The data medium was removed before or during the save.	Re-insert the data medium and re-start the save process.
	Writing is not allowed on the data medium.	Disable write protection on the data medium.
	Data medium is full.	Delete unnecessary data from the data medium and try again.
Invalid status!		Contact the Customer service.
Unknown error!	You want to work with SECTION-Control, but there is no connected job computer that supports SECTION-Control.	Connect a suitable job computer or deactivate SECTION-Control.
No sections could be detected!	No sections are configured in the ISOBUS job computer.	
The implement does not have a working width!	The working width or geometry have not been configured in the ISOBUS job computer.	Configure the ISOBUS job computer.
No task has been started!	You have configured the ISOBUS-TC to work with ISO-XML. Therefore, TRACK-Leader expects a task. No task was started in ISOBUS-TC.	Start task in ISOBUS-TC or deactivate the use of ISO-XML in ISOBUS-TC.
No valid implement data were found!	The working width or geometry have not been configured in the ISOBUS job computer.	Configure the ISOBUS job computer.
RTK signal lost!	No RTK signal is available due to signal obstruction.	GPS receiver must be in open view to the sky.

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Error message text	Possible cause	How to fix the problem
	No mobile network reception.	
	You are too far away from the base station.	
The implement data is still being loaded.	If this message appears for a long time, the terminal is connected to a job computer that is not responding.	Connect a different job computer to the terminal. You may not be able to use SECTION-Control with this job computer.
	The device arrangement in the ISOBUS-TC app was not configured. Read the instructions for the terminal.	Configure the device arrangement in ISOBUS-TC.
No device has been detected!	TRACK-Leader has not received any information through the connected job computer or there is no connected job computer.	Connect a job computer that supports SECTION-Control
Implement has a working width of 0	The working width transmitted by the job computer is 0 m.	Correctly set the working width in the job computer; contact the implement manufacturer.
The implement does not have any sections.	The connected ISOBUS job computer does not support SECTION-Control.	

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13 Notes

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